Why can't I trade?
Exchange discretion in calling halts

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Abstract

Stock exchanges exercise discretion when calling individual stock trading halts though the decision making behind the halt remains a "mystery" (WSJ, 2018). Between 2012 and 2015 halts are associated with large price movements (on-average 11%) and occur frequently with 97% of trading days having five or more halts. Given their importance, we investigate how exchanges use this discretion and whether the use of discretion alters the effectiveness of the halts. Our findings suggest halts reflect the preferences of exchange constituents as opposed to simply the stated objectives of the exchanges (i.e., minimizing excess volatility and trades at off-equilibrium prices). Specifically, we find halts are less likely for (i) good news than bad, (ii) firms with opportunistic CEO traders, and (iii) firms with low short interests. We also find some evidence that CEO characteristics are associated with halt outcomes. Concerning halt effectiveness, we find the level of unexplained halt discretion is positively associated with both small halt returns and larger post-halt stock return reversals, suggesting halts with more discretion are less effective.

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1. Introduction

Discretion by capital market participants plays a central role in the generation, dissemination, and efficient pricing of information. While decades of prior research examines how discretion affects the decisions and consequences of various market participants such as managers, analysts, auditors, and creditors, little is known about how discretion affects the decisions of stock exchanges. In contrast, the literature on exchanges focuses on the consequences of exchange actions without fully understanding the discretion and incentives leading to those actions.[1] Stock exchanges exercise discretion when calling individual stock trading halts (i.e., pauses in trading to allow investors to digest information before committing to trades, hereafter 'halts') although the decision making behind the halt remains a "mystery" (WSJ, 2018). We investigate how exchanges use this discretion and whether the use of discretion alters the effectiveness of the halts.

In order to more fully understand the consequences of halts, it is important to understand what discretion exchanges have and how they choose to use this discretion when calling halts. This issue is not unique to halts and can be seen in the evolution of other literatures. For example, we know from the management forecasting literature that managers choose whether to release a management forecast. They also choose the timing, form, bias and precision of said forecast. It is difficult to determine how management guidance affects consequences (e.g., shareholder litigation, information asymmetry, or the cost of capital), without understanding what discretion mangers have and how they choose to use this discretion. We believe the use of discretion is especially important for halts as the FINRA and SEC guidelines do not provide explicit advice on when to call a halt for impending news.

[1] An exception is Macey and O'Hara (2002), which examines listing fee and listing requirement decisions.

The conflicting incentives (and intense competitive environment) faced by exchanges further motivate our interest in understanding how exchanges exercise discretion when calling halts. First, exchanges and regulators contend that halts minimize excess volatility and trades at off-equilibrium prices, thus reducing the occurrence of trades at inefficient prices.[2] However, calling a halt (temporarily) drives liquidity to zero, which stands in direct contrast to the normal exchange incentive of maintaining liquid markets. Second, exchanges seek to maintain market prices that quickly reflect important information. However, this breaks down when information is "too important" or prices move "too quickly." That is, when these circumstances occur or are anticipated, exchanges can (and often do) call halts to stop trading in a given stock.

Stock exchange decisions have important implications for the manner in which information is impounded into price. Halts occur frequently, are associated with large price movements (e.g., Hopewell and Schwartz, 1978; Lee, 1992), and have been used by every major stock exchange around the world. Their importance appears to have increased even further in recent years. During our period of study (2012-2015) only one trading day has zero halts and 97% have five or more. Further, halt frequency almost doubles during our four year sample window and halt policies and procedures continue to be refined (see Moise and Flaherty, 2017, for a review). Finally, the absolute returns surrounding the halt are substantial, with a mean 2-trading day return of 10.9%.

Prior to embarking on our primary research questions, we provide a test of whether exchanges hold considerable discretion regarding when to call halts. While the halt guidelines suggest exchanges hold discretion, we are unaware of any empirical evidence supporting this claim. We examine the use of halts by NYSE and Nasdaq to evaluate the claim. Ceteris parabis, the use of

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[2] See, for example, the SEC proposal to address extraordinary volatility in individual stocks and broader stock market (https://www.sec.gov/news/press-release/2012-2012-107htm), the SEC Plan to Address Extraordinary Market Volatility (https://www.sec.gov/news/press/2011/2011-84-plan.pdf) or the Oversight Hearing on Market Circuit Breakers (https://www.banking.senate.gov/98_01hrg/012998/witness/cochrane.htm), both as of 5/8/2017.

halts across exchanges should be similar unless the exchanges use discretion and do so differently. For example, both exchanges (i) are beholden to SEC and FINRA regulations, (ii) have advanced notice disclosure requirements, (iii) have advanced electronic trading systems, and (iv) often compete for the same customers (i.e., traders and listed firms). Despite these similarities, we find strong evidence that exchanges implement halts differently. Specifically, Nasdaq has a greater propensity to call a halt than NYSE (controlling for listed firm and information characteristics) and this difference is concentrated in halts where exchanges have the most discretion.

Our first research question asks how exchanges use discretion when calling halts. Conversations with industry insiders indicate the listing exchange benefits directly from trading halts by consolidating trades at the reopen rather than having the trades fragmented across other exchanges. We investigate the importance of this direct economic benefit by examining the post-halt auction trading volume and conclude that incremental trading commissions are likely to be relatively small. Given the modest evidence of direct economic benefits, we shift to potential indirect economic benefits derived from constituent satisfaction. This analysis is primarily motivated by three observations. First, listing fees are an important source of revenue for exchanges highlighting the importance of retaining their listed firms (Macey and O'Hara, 2002). Second, the popular press has expressed concerns that exchanges have become too close to their listed firms (WSJ, 2018). Third, several non-US exchanges have a formal process by which listed firms can request a halt, suggesting that at least some exchanges explicitly call halts to cater to the preferences of their constituents (i.e., managers, investors, and dealers/market makers).

Our analysis of potential constituent preferences yields four predictions. First, we predict exchanges are more likely to call halts for bad news than for good news. Evidence suggests that individuals are more sensitive to decreases in financial wealth than increases (e.g., Kahneman and

Tversky, 1979; Barberis et al., 2001). This asymmetry likely affects external investors as well as firm executives. In addition, market makers (who are important for price stability and liquidity) face greater inventory risk for bad news than for good due to their preference for holding positive positions (e.g., Comerton-Forde et al., 2010; Johnson and So, 2018). To the extent exchanges are responsive to market maker, investor, and/or firm preferences, they will be more sensitive to impending bad news than good news when making halt decisions.

Second, we predict exchanges are less likely to call halts for firms where CEOs likely benefit from informed trading. Prior work suggests insiders prefer fewer constraints on their trading (Roulstone, 2003). To the extent CEO trading is constrained by halts and exchanges are responsive to the listed firm CEO preferences, we would expect a lower likelihood of halts for firms with informed CEO trading. We also predict CEOs engaged in liquidity trading would have similar preferences, albeit weaker.

Third, we predict exchanges are more likely to call halts for firms with high short interests. Short sellers are generally not viewed favorably by management because they are betting on poor future performance. In some cases, firms actually use aggressive techniques to impede short seller profits (Lamont, 2012).[3] Halts may be one technique in which firms could impose additional risk on short sellers. To the extent halts impede short sellers and exchanges are responsive to the listed firm preferences, we expect a greater likelihood of halts for firms with high short interests.

Fourth, while we are unable to generate directional hypotheses, we predict that halt outcomes are associated with CEO characteristics. Prior research suggests managerial style and managerial networks are important for a wide range of corporate decisions (Bertrand and Schoar, 2003; Perry

[3] As a recent example, short sellers have filed suit against Tesla claiming Elon Musk used Twitter statements as a "weapon against short sellers of Tesla shares." (*Kalman Isaacs vs. Elon Musk and Tesla,* Case 3:18-cv-04865 filed 8/10/18 (Northern District of California, San Francisco Division)).

and Peyer, 2005). Ex ante, there is no reason to expect these CEO characteristics to be correlated with halts unless CEOs have the ability to influence halt decisions and their characteristics lead to different halt preferences.

In order to test whether our proxies capture constituent preferences as opposed to expected returns and volatility, we separately examine high discretion proactive halts (i.e., halts more likely based on judgment) and low discretion reactive halts (i.e., halts more likely mechanical in nature). We view the evidence to be strongest when a proxy is significantly related to proactive halts and the coefficient using proactive halts is significantly greater (in absolute terms) than the related coefficient using reactive halts.

Consistent with exchanges catering to constituent preferences, we find bad news is more likely to result in a halt than good news, controlling for the magnitude of the news. Further, we find halts are less likely for firms with opportunistic CEO traders, less likely for firms with CEOs engaged in routine trading, and more likely for firms with high short interests. We also find some evidence that CEO characteristics are associated with halt outcomes. Collectively, this evidence suggests exchanges cater to their various constituents when deciding whether to call a halt.

Our second research question asks whether the use of discretion by exchanges is associated with halt effectiveness. Evaluating the consequences of halts is complicated by the need to generate a defensible counterfactual. Noting this challenge, we propose two tests that we believe are less subject to counterfactual concerns. Specifically, we examine the association between halt discretion (i.e., halts less explained by expected returns and volatility) and two market consequences that are inconsistent with an effective halt. We test for halt ineffectiveness using (i) the likelihood of a small halt return (i.e., an unnecessary halt or a "miss"); and (ii) stock return reversals after the halt. We find the level of unexplained halt discretion is positively associated with both small halt returns and larger stock return reversals after the halt, suggesting halts with more discretion are less effective.

The tests we present use a broad sample of firm-quarters by identifying whether a given firm-quarter contains a trading halt. This approach allow us to clearly define both halt and non-halt observations while preserving a large sample. However, this approach does not identify the specific information events underlying the halts. As a result, we repeat our tests on one particular type of material information release (8-K filings) and report these results in an Internet Appendix. This approach links halts to one source of material information at the cost of sample size and generalizability. The results are highly consistent with those reported for the firm-quarter sample.

Our study is not only important to academics, but also to policy makers, regulators, and investors for two primary reasons. First, we show halt decisions reflect the preferences of exchange constituents as opposed to simply the stated objectives of the exchanges (i.e., minimizing excess volatility and trades at off-equilibrium prices). Rather than halting to obtain direct economic benefits, our results are consistent with critiques in popular press that "exchanges have become beholden to the companies they list" (WSJ, 2018). Second, we show that halts are less effective when unexplained discretion is high, which is especially important given the ongoing regulatory debates about the optimal use of halts.

We believe halts provide a fruitful setting for future research. For example, our study highlights two seemingly opposing trends that could be reconciled. Specifically, it appears exchanges are increasing the use of intraday proactive halts (that occur in advance of significant impending news), which contrasts the general trend of shifting disclosure of material news outside of market hours (e.g., earnings announcements). Halts also provide a unique setting that can enhance our understanding of information transfers as the subject firm is halted but peer firms typically are not.

In addition, studies interested in investigating intraday price responses to news could use halts to identify major news events.

Future research may also benefit by partitioning halts into those that are proactive (i.e., based on anticipated news and price movement) or reactive (e.g., triggered by rules that respond to information already in the public domain). We provide a method to identify these halt types that can be used across exchanges. Our validation tests confirm that proactive halts have considerable discretion while reactive halts do not.

2. Halts and exchanges

2.1 Individual stock trading halts

The key regulatory body overseeing the U.S. financial markets is the SEC. Its mission is to "protect investors, maintain fair, orderly, and efficient markets, and facilitate capital formation."[4] To achieve this, the SEC institutes regulations that govern the securities industry. While the SEC is the ultimate authority, during our period of study (2012-2015), the SEC relied heavily on recommendations provided by the Financial Industry Regulatory Authority (FINRA). FINRA, an independent organization overseen by the SEC, regulates U.S. stock markets.

The SEC and FINRA provide guidance that influences the timing and prevalence of halts, however actual implementation is in the hands of the exchanges. In particular, both NYSE and Nasdaq employ a MarketWatch group to monitor market activity and oversee the disclosure requirements of listed-firms. MarketWatch determines whether news notifications from listed firms are material, monitors newswires, evaluates market activity, and communicates with listed

[4] As part of this objective, "…the SEC requires public companies to disclose meaningful financial and other information to the public. This provides a common pool of knowledge for all investors to use to judge for themselves whether to buy, sell, or hold a particular security. Only through the steady flow of timely, comprehensive, and accurate information can people make sound investment decisions. The result of this information flow is a far more active, efficient, and transparent capital market that facilitates the capital formation so important to our nation's economy." Per https://www.sec.gov/Article/whatwedo.html as of 4/4/2017.

firms to ascertain if a halt is warranted (for ease of notation, we refer to MarketWatch as the exchange hereafter).[5] We next discuss the various halt types used on NYSE and Nasdaq based on several sources from the key regulatory bodies including the SEC, FINRA, and the exchanges.[6]

The first type of individual stock halt, a news halt (sometimes referred to as a regulatory halt), is proactively declared by exchanges in anticipation of a material news release.[7] When a halt of this type is imposed by the primary listing exchange, the halt must be honored on all other U.S. exchanges on which the security trades (including the options market). Helping to facilitate the decision of whether or not to proactively call a news halt, stock exchanges have their own disclosure guidelines that are more stringent than the SEC's.[8] These guidelines require that the listed firms notify the Exchange at least 10 minutes in advance of news releases occurring shortly before or during market hours.[9] This advance notice allows the exchange to determine whether the stock should be halted. While the disclosure rules provide examples of material types of information, news halts are called at the full discretion of the exchange.

The second type of halt is reactively declared by stock exchanges based on price limits and is also honored on all other markets. We refer to these halts as price limit halts, though they are sometimes referred to as single-stock trading pauses, single-stock circuit breakers, or security-level price limits.[10] Leading up to the sample window, individual stock price limits were as

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[5] Per Nasdaq MarketWatch description (https://www.nasdaqtrader.com/Trader.aspx?id=MarketWatch); NYSE memo on Listed Company Guidance dated January 12, 2015 (https://www.nyse.com/publicdocs/nyse/regulation/nyse/2015_NYSE_Listed_Company_Compliance_Guidance_Memo_for_Domestic_Companies.pdf); and NYSE Timely Alert Reminder dated November 18, 2014 (https://www.nyse.com/publicdocs/nyse/regulation/nyse/timelyalertmemo.pdf), all as of 5/4/2017.

[6] See https://www.sec.gov/fast-answers/answerstradinghalthtm.html (as of 4/5/2017), http://www.finra.org/investors/alerts/when-trading-stops-halts-suspensions-other-interruptions (as of 4/5/2017), NYSE Listed Company Manual, and Nasdaq Equity Rules.

[7] While we do not have documentation of when these halts were initiated, they have been in use by the exchanges since at least the mid-1970's as documented in Hopewell and Schwartz (1978).

[8] See NYSE Listed Company Manual, Sections 201 and 202 and Nasdaq Equity Rules Section 5250.

[9] The NYSE requirement was amended towards the end of the sample window on Sept 2, 2015, to extend the disclosure window to begin at 7:00am (https://www.sec.gov/rules/sro/nyse/2015/34-75809.pdf)

[10] Single stock price limits were initially implemented following the "flash crash" on May 6, 2010.

follows: a 10% price movement within five minutes for S&P 500 and Russell 1000 Index firms, 30% for stocks priced at $1.00 or greater, and 50% for stocks below $1.00. The SEC made minor changes to the price limits via the Limit Up/Limit Down (LULD) guidelines that were approved on May 31, 2012 and were phased in beginning on April 8, 2013. While the old rules triggered halts given a price shift, the new rules require the use of pricing bands around a calculated reference price (the average traded price over the prior five minutes).[11] These rules are designed to reduce occurrences of extraordinary market volatility and reduce the number of halts resulting from errors (FINRA 13-12). That being said, prior studies argue that these changes were relatively minor.[12]

The third type of halt is only used by NYSE and is due to perceived order imbalance.[13] These order imbalance halts (sometimes called pseudo-halts) are distinct and prior research argues that these are not actually halts because trading still occurs on other markets (Chakrabarty, Corwin, and Panayides, 2011). Based on this logic, we exclude from the sample any halts with trading on other exchanges during the halt window.

2.2 Prior literature on trading halts

Prior research focuses on the consequences of halts with three primary findings. First, halts occur frequently and are associated with substantial shifts in equilibrium prices (e.g., Hopewell and Schwartz, 1978; Lee, 1992). Second, information transmission during halts promotes the price

[11] The pricing bands are set a certain percent away from the reference price, depending upon the security (i.e., in the S&P 500 or Russell 1000 Index) and the reference price. Initially, and similar to prior guidelines, the pricing bands only apply from 9:45a.m. to 3:35p.m. The bands were subsequently extended to the first 15 minutes and last 25 minutes, with doubled pricing band parameters to accommodate the increased volatility. The stock enters a "limit state" for 15 seconds if one side of the market exceeds the limit band and the other side reaches the band (e.g., the national best bid (NBB) is below the lower band and the national best offer (NBO) is equal to the lower band or vice versa). If the quoted prices do not revert back into the allowable band range within 15 seconds, the exchange declares a 5-minute trading pause.

[12] Brogaard and Roshak (2016) note that "the limit up-limit down rules are only slightly different from the [prior] rules" and Moise and Flaherty (2017) note that "[t]he price limits referenced in the academic literature are similar in nature to the price bands introduced by the [limit up-limit down] rules" and that these new rules are simply "a more finely calibrated mechanism."

[13] Similar to news halts, we do not know when order imbalance halts were initiated on NYSE, however, we do know they have been in use on NYSE since at least the mid-1970's as documented in Hopewell and Schwartz (1978).

discovery process (Kim and Yang, 2004). For example, Corwin and Lipson (2000) document that investors adjust their positions by increasing market or limit order submissions and cancelations during the halt, leading to significant price discovery. Further, specialist indicator quotes during the halt are consistent with a progressive price discovery process (Schwartz 1982; King et al., 1992) and the re-opening prices are a good predictor of future prices (Corwin and Lipson, 2000). Third, trading volume and volatility following halts are higher than normal levels (Lee et al., 1994; Christie et al., 2002).

Concurrent studies continue to investigate the consequences of halts, specifically related to price limits. For example, Hautsch and Horvath (2017) document that price limits break local price trends, lead liquidity providers to revise positions, enhance price discovery, and accelerate volatility and bid-ask spreads. Meanwhile, Brogaard and Roshak (2016) document that price limits reduce the frequency and severity of extreme price movements, but induce price under-reaction. Finally, an SEC white paper provide descriptive evidence on the frequency of trading pauses and erroneous trades under the LULD regulations (Moise and Flaherty, 2017).

2.3 Sample selection and descriptive evidence on halts

Table 1 provides the details of our halt sample selection. Panel A starts with all halts identified in the TAQ quote files from 2012 to 2015 to identify instances of halts on NYSE, Nasdaq, and AMEX. Consistent with prior literature, we identify halts in the TAQ quote files by searching for non-standard condition codes (e.g., Christie et al., 2002).[14] This yields a four year sample of 27,787 halts. We then restrict the sample to observations appropriate for testing our empirical predictions. First, we remove halts related to exchange-wide shutdowns, as these are not relevant for our

[14] Specifically, we search for quotes where the condition code is in ("D", "P", "I", or "M") and the bid and offer prices are zero. Next, we also search for quotes where the condition code is equal to "N", but do not require the bid and offer prices to be zero, as these observations also have the characteristics of trading halts.

research questions. Second, we merge the resulting sample with CRSP and Compustat and eliminate securities other than common stock (e.g., exchange-traded funds). Third, we also eliminate ‘halts’ where trading occurred on other exchanges, as Chakrabarty et al. (2011) document that these non-regulatory (primarily order-imbalance) halts have different trading environment characteristics than true halts. Finally, we retain one halt per firm per day (i.e., when there are multiple halts in a given day, we keep the first for which there are five minutes of prices preceding the halt) and remove the halts related to AMEX. This yields a sample of 7,914 halts for 2,391 unique firms.

In Panel B, we provide descriptive statistics on the halt sample. We begin by providing details on the duration of the halt in minutes. The interquartile range is 31 minutes, increasing from 5 minutes at the first quartile to 36 minutes at the third quartile. The mean duration is substantially longer, however, at 101 minutes. This reflects the presence of extremely long halts, or those that do not resume within the trading day.[15] Next, we provide details on the information associated with the halts. Consistent with prior literature (e.g., Bhattacharya and Spiegel, 1998), we show that halts are associated with large price changes on average. Specifically, the average absolute two-trading day return (beginning at the prior market close) is greater than 10%. The sample is also evenly distributed between good and bad news halts (according to these same returns).

In the second portion of Panel B, we provide descriptive statistics on the intraday returns (based on the mid-point of the bid-ask spread) immediately surrounding the halt.[16] On average, we show an absolute return of 6.3% in the 10-minute window preceding the halt, 6.6% during the halt, and 4.0% in the 10-minute window following the halt.

[15] We code halts that do not resume during the trading day with a resumption time of 11:59 p.m.

[16] We omit halt observations that do not have regular quote information in TAQ from 10-minutes prior to 10-minutes after the halt. We also omit observations where the bid-ask spread exceeds 100 percent of the midpoint.

Figure 1 provides evidence that halts are frequent events on the major U.S. exchanges during the sample period (2012 to 2015). Consistent with prior literature, we find halts are common on U.S. exchanges. For the population of halts (Panel A), we find virtually all trading days have at least one halt and 97% have five or more. The mean for a given day is 17.6 halts. After removing halts that do not meet the sample requirements (Panel B), we find that the most common occurrence in the sample is 4 halts in a day (which occurred on 85 trading days in the sample).

Figure 2 provides additional details on the prevalence of halts through time. Specifically, it shows the percent of firms-quarters associated with a halt during the sample period. The percent of firms experiencing a halt approximately doubles during our sample, increasing from 4.6% of firms in the fourth quarter of 2012 to 9.2% of firms in the fourth quarter of 2015. Interestingly, Figure 2 also provides descriptive evidence that halts appear to be more common in the fourth quarter of the calendar year.[17]

Figure 3, Panel A provides plots of the cumulative 30-second returns (based on the mid-point of bid-ask spreads) from 10-minutes prior to the halt to 10-minutes after the halt. We partition halts on good and bad news according to the total return across this interval. The dashed portion of each line represents the change in price during the halt (time 0). Each of the lines displays a large price change during the halt. Interestingly, the lines display at least some drift following the halt (particularly in the first 30 seconds following the halt). The mean magnitude of return around the halt is larger for good news (11%) than for bad news (8%).

Collectively, the halt literature and our descriptive evidence suggests that halts are a particularly important subset of events that occur frequently and play a key role in the evolution

[17] In untabulated analyses we examine the halt trends separately for firms with December fiscal year ends and non-December fiscal year ends. Results suggest that the documented trend is a calendar fourth quarter effect, rather than a fiscal fourth quarter effect.

of prices. In the following sections, we investigate how discretion is applied to the halt decision and whether it has implications for the effectiveness of halts.

2.4 Settings

We use a broad sample of firm-quarters from 2012-2015, where each firm-quarter is defined as a halt observation if at least one halt event occurs for that firm during that quarter. All other firm-quarters are non-halt observations. Table 2 provides details on sample selection that we use to investigate our research questions. The sample begins with all 109,939 firm quarter observations on CRSP. We then apply similar filters to those used for the halt sample (merge with Compustat, drop ETFs, drop AMEX observations) and require market value of equity to be non-missing at the end of the prior quarter. These filters result in a firm-quarter sample of 66,460 observations (5,413 firms). Finally, we merge the resulting sample with the halt sample from above to identify firm-quarters with an associated halt, finding 3,764 firm-quarters with at least one halt.

Using this broad sample maximizes the sample size and generalizability of our findings. However, it limits our ability to evaluate how halts are related to specific information events. In light of this limitation, we perform the same analyses using a second sample based on 8-K filings with the SEC during the same four-year window. As halts are the result of material information (actual or rumor-based) and the SEC requires firms to file 8-Ks to "announce major events," we examine when 8-Ks are associated with halts.[18,19] While this sample provides us with greater insights into the association between halts and the underlying information events, we realize 8-Ks are only one source of material information such that the results may not generalize. Nevertheless,

[18] See https://www.sec.gov/fast-answers/answersform8khtm.html as of 4/13/2017.
[19] While it is possible to get a precise time on when 8-Ks are accepted by the SEC, this timestamp does not reflect precisely when the 8-K became publicly available (Rogers, Skinner, and Zechman 2017). Furthermore, there is no requirement that the 8-K release is the first time that the information became public.

we provide the results from the 8-K sample in the Internet Appendix. As shown there, our central findings are robust to using this alternative sample.

3. Exchanges and discretion

3.1 Evaluating the claim

To evaluate the claim that exchanges have discretion, we examine whether NYSE and Nasdaq make different halt decisions (holding listing firm characteristics and information content constant). Unless the exchanges use discretion, and do so differently, the likelihood of calling halts should be similar (after controlling for differences in expected returns and volatility). Specifically, the disclosure requirements and trading pause guidelines at each exchange arise from common SEC and FINRA regulations. Further, both exchanges have similar, albeit not identical, market structures (e.g., electronic trading systems, listing requirements) and objectives (e.g., to attract listing firms, earn trading commissions, and reduce extraordinary volatility) as well as disclosure regulations for listed firms.[20]

If we find a difference in halt across exchanges, it is consistent with the exchanges using discretion in calling halts. In contrast, not finding a difference would be consistent with either a lack of discretion or both exchanges choosing to use their discretion in a similar manner.

3.2 Where the discretion lies (proactive/reactive)

We expect the discretion to be greater for some halt types than others. Specifically, we expect these relations to be stronger when trading halts are proactively declared in anticipation of a material news release as opposed to reactively triggered by mechanical rules. Ideally, we would

[20] Prior literature acknowledges that NYSE market-making specialists differ from Nasdaq market makers. While this was an important difference historically, our understanding is that most of the market-making differences were minimized with NYSE's transition to a hybrid market. NYSE continues to contend that Designated Market Makers are a differentiating factor. Our discussions with industry specialists suggest this difference is unlikely to be substantial.

split the sample between those halts that are mechanical (and therefore contain little if any discretion)[21] and those that are based on judgment. Unfortunately, the data to disentangle these types of observations is not readily available.

One method to bifurcate the sample based on discretion is to use the TAQ condition codes (e.g., “D” and “P” to capture discretionary news based halts versus “M” to primarily capture price limit or mechanical halts). However, these classifications are only available for NYSE halts; all Nasdaq halts are coded the same (“N”) regardless of the underlying motivation. A second method to classify halts based on discretion is to (attempt to) replicate the mechanical halt rules. Unfortunately, the price limit halts (e.g., halts arising from the price limit and LULD rules) are very technical in nature and have evolved during the sample period (e.g., to date the LULD rules have gone through 12 amendments). Furthermore, the data (e.g., price bands) to precisely identify these halt types is not available for the sample period.

As a result of these difficulties, we devise a procedure to separate those halts that are more likely to contain discretion (proactive) from those that are less likely (reactive). Our algorithm reflects the spirit of the LULD rules. Conceptually, for each of the halts in the sample with sufficient stock return data, we classify the halt as proactive or reactive depending on whether there is a large absolute stock return in the five minutes prior to the halt (reactive) or not (proactive). This entails a small loss of sample resulting in 6,496 halts classified. We code instances where the absolute value of the five-minute stock return (as calculated via midpoints of the bid-ask spread) prior to the halt is greater than or equal to five percent as reactive and instances where the return is less than five percent as proactive.

[21] The mechanical halts stem from the LULD rules. While these rules are almost entirely mechanical in nature, they do allow for a minor amount of discretion. For example, the rules allow for, but do not require, a primary listing exchanges to declare a halt when a stock is in a “Straddle State” (i.e., when one quote is outside the price bands and the stock is not in a limit state). See SEC Release No. 34-67091.

In Table 3 we provide a summary of our halt classification scheme across the various quote condition codes. To the extent our classification of proactive and reactive reflects variation in discretion, we expect news dissemination (“D”) and news pending (“P”) to be predominantly coded as “proactive” in our classification scheme. In contrast, we expect additional information (“M”) to be coded as “reactive” as this quote condition appears to be primarily reserved for price limit halts. We do not have any expectations regarding the order imbalance (“I”) halts (aka pseudo-halts). Consistent with expectations, we find that 92% of the classifiable news disseminated and news pending halts are coded as proactive, whereas 84% of the additional information (“M”) halts are coded as reactive. Overall, these results suggest that our proactive and reactive classifications are reasonable (albeit imperfect) proxies for more and less discretionary halts, respectively.

3.3. Descriptive evidence on proactive and reactive halts

Similar to the descriptive evidence for the total population, we provide time trends and return plots for proactive and reactive halts separately. In Panel B of Figure 2 we present the time trend of proactive and reactive halts. Both proactive and reactive halts exhibit an upward trend. For example, the percent of firms encountering a proactive (reactive) halt increased from 2.0% (0.9%) to 5.2% (4.8%) from 2012 to 2015. In Panel B of Figure 3 we provide return plots for proactive and reactive halts separately to illustrate our classification scheme. By construction, a large (small) portion of the cumulative return occurs before the halt for reactive (proactive) halts. Specifically, almost 85% of the average cumulative return for good news reactive halts occurs before the halt begins, whereas only 15% occurs before good news proactive halts. We find consistent trends for bad news halts, with approximately 75% (7%) of the average cumulative return for bad news reactive (proactive) halts occurs before the halt begins.

3.4. Evidence on exchange discretion

We test whether NYSE and Nasdaq have different propensities to halt trading in Table 4. The univariate results in Panel A document that NYSE observations (*NYSE*) represent 43% of the no-halt sample but only 21% of the halt sample, suggesting Nasdaq has a greater propensity to call halts. We also compare our control variables (for expected returns and volatility) across the halt and no-halt samples. The controls include variables measured at the end of the prior firm quarter: firm size (*LnMVE*), trading volume (*Volume*), stock price volatility (*Volatility*), analyst coverage (*LnNumAnalysts*), and percent institutional ownership (*InstOwn*). The controls also include variables measured for the current quarter: absolute value of the most extreme daily return in the quarter (*AbsExtremeRet*), absolute value of returns (*AbsQtrRet*), the number of 8-K filings (*LnNum8Ks*), and whether the firm issued a management forecast (*MgmtFcst*). As expected, each of these variables is significantly different across the two samples.

Panel B shows all variables differ significantly between the NYSE and Nasdaq samples. Of primary interest, Nasdaq stocks are 2.8 times more likely to be halted than NYSE stocks (7.77% of firm quarters versus 2.78%). As expected, the NYSE sample contains larger firms with more institutional ownership and analyst coverage. NYSE firms also have more volume of stock traded and a less volatile stock price. The NYSE firm-quarters have lower absolute quarterly returns, lower absolute extreme daily returns, fewer 8-Ks filed with the SEC, and are more likely to have issued management forecasts. We use multivariate tests and entropy balancing in the next panel to control for these key differences.

Panel C provides our formal tests of whether the exchanges differ in their use of halts. In Column 1, we regress halts on *NYSE* and the controls for expected returns and volatility, and find that Nasdaq has a greater propensity to call a halt than NYSE.

While including linear controls helps minimize the correlated omitted variable problem resulting from firm differences, they may not be adequate. As a result, we use an alternative approach in Column 2 to obtain covariate balance across the NYSE and Nasdaq samples. Specifically, we use entropy balancing to re-weight the Nasdaq sample such that the control variables and fixed effects in Column 1 are indistinguishable between the NYSE and Nasdaq samples across three moments (mean, variance and skewness). After entropy-balancing, we continue to find a negative marginal effect on NYSE (1.31%, p-value < 0.01), which is both economically and statistically significant. This 1.31% difference implies that moving from NYSE to Nasdaq leads to an increase in probability of a halt from 2.78% (the NYSE sample probability in Panel B) to 4.09% (the probability of a Nasdaq halt after entropy-balanced re-weighting, equal to 2.78% + 1.31%), which is a 47% greater probability of a halt.

To the extent that the differential halting behavior across exchanges is driven by discretion, we expect the prior results to be concentrated in proactive halts. We expect minimal, if any, difference across exchanges in reactive halts where discretion should be low, with large differences suggesting either the entropy balancing was ineffective or the measurement error in the proactive/reactive bifurcation is severe. In Columns 3 and 4, we find the variation in halt decisions across exchanges is present for proactive halts but not for reactive halts. Furthermore, the differences across the proactive and reactive specifications are significant (p-values < 0.01). These results are consistent with entropy balancing successfully controlling for differences between listed firms on NYSE and Nasdaq. Collectively, the evidence indicates that exchanges have discretion when calling halts and that NYSE and Nasdaq use their discretion differently.

4. Research Question 1: How do exchanges use discretion?

In order to enhance our understanding of incentives surrounding halts, we interviewed five industry insiders with differing areas of expertise and representing various constituencies.[22] These conversations indicated that exchanges may use a number of methods to maximize value within the constraints of FINRA and SEC guidelines and regulations. Specifically, not only do exchanges take actions to provide direct economic benefits but also may take actions providing indirect benefits by catering to their constituents (e.g., listed firms).

4.1. Direct economic benefit analysis: consolidation of trades

One potential direct economic benefit of halts to the listing exchange is the consolidation of trades. Order flow during regular trading periods is fragmented across 15 different exchange codes included in the TAQ database. However, after a trading halt, the listing exchange hosts a re-opening auction and receives all of the corresponding commissions (i.e., trading at the auction is not fragmented, but consolidated at the listing exchange).

In untabulated analysis, we find that \$324,600 is traded per halt, on average, in the reopening auction. To gauge the economic significance of this value we provide a rough proxy for the trading volume "lost" during the halt. Specifically, for each halt we accumulate the volume leading up to the halt over a window equivalent to the halt length. On average, the pre-halt window volume is \$4,519,940, of which \$2,382,320 (53%) occurs on the listing exchange. Compared to these figures the \$324,600 does not seem economically large, raising doubts that consolidating trading commissions is a first order incentive.

[22] In addition, we read (with the help of doctoral and undergraduate students) all 42 of the comment letters submitted to the SEC for the recent LULD rules and amendments (Comment letters from https://www.sec.gov/comments/4-631/4-631.shtml (as of 12/2/2017). Overall, the letters were strongly in favor of the LULD rules and only argued for minor adjustments (e.g., date of implementation and whether halts should be permitted around market open and close). None of these parties expressed a desire to eliminate halts, but this may not have been the best forum for that debate. Given the minor nature of the suggestions, these letters did not yield economically meaningful cross-sectional predictions.

4.2. Indirect economic benefit analysis: predictions

One potential indirect economic benefit of halts to the listing exchange is increasing the satisfaction of constituents (e.g., investors, market makers, and/or firms). There are several reasons why exchanges may view increasing the satisfaction of constituents as a benefit. First, listing fees are an important source of revenue for exchanges highlighting the importance of retaining their listed firms.[23] Second, according to the Wall Street Journal, "critics contend the exchanges have become beholden to the companies they list" (WSJ, 2018). Third, several non-US exchanges have a formal process by which listed firms can request a halt, suggesting that at least some exchanges call halts based on the preferences of their constituents (i.e., managers, investors, and dealers/market makers).[24] To the extent exchanges seek constituent satisfaction, the exchange may cater to their preferences. We make four predictions where we expect constituents to have preferences regarding halts.

4.2.1 News direction

We begin by examining the information underlying halts. Absent discretion on the part of the exchanges, there is no obvious reason to anticipate the direction of news to influence the likelihood of a halt, after controlling for the magnitude of the news. The guidance provided by regulators, price limit halt rules, and disclosure requirements for listed firms are all symmetric and do not differentiate between good news and bad news.[25]

[23] For example, Macey and O'Hara (2002) document that listing fees make up 40% of NYSE revenue.

[24] For example, the Sydney Stock Exchange Listing Rules indicate the exchange may "grant a trading halt at the written request of a listee" and the FAQs provided by the Shanghai Stock Exchange describe halts as "a basic right entitled to listed companies."

[25] As an example of the regulatory guidance, FINRA explicitly notes that "the more likely the announcement is to affect stock price, *whether positively or negatively*, the more likely the exchange is to call for a trading halt…" (emphasis added). See http://www.finra.org/investors/alerts/when-trading-stops-halts-suspensions-other-interruptions as of 5/8/2017. As an example of the disclosure requirements, the NYSE Manual, Section 202.06 explicitly states that "[u]nfavorable news should be reported as promptly and candidly as favorable news."

However, to the extent that exchanges are influenced by constituent preferences, there are several reasons why exchanges would be more likely to call halts for bad news than good. First, there is substantial evidence in the behavioral finance literature that individuals are more sensitive to reductions in financial wealth than increases, often referred to as loss aversion (e.g., Kahneman and Tversky, 1979; Thaler and Johnson, 1990; Gertner, 1993; Barberis, Huang, and Santos, 2001). This asymmetry likely affects not only external investors but also firm executives.

Second, market makers (important for exchange price stability and liquidity) tend to be more sensitive to bad news than to good news surprises. Market makers provide liquidity by serving as the trade counterparty in response to imbalanced demand and are often forced to take temporary positions that expose them to price fluctuations (Johnson and So, 2018). Despite the fact that market makers take actions to reduce their exposure to inventory risk (e.g., Chordia, Roll, and Subrahmanyam, 2002; Nagel, 2012; and So and Wang, 2014), they generally hold positive positions (e.g., Camerton-Forde et al., 2010; Johnson and So, 2018).[26] Because bad news events would likely exacerbate market makers' exposure to downside inventory risk, they may be more sensitive to (and therefore prefer halts for) bad news relative to good news. We proxy for news direction using an indicator (*GoodNewsIndicator*) equal to one if the most extreme daily return in the quarter (i.e., the day most likely to have a halt) is positive.

4.2.2 CEO trading behavior

CEOs have private information about the historic performance and future prospects of their firm. Due to this information advantage, insiders frequently earn excess returns on their trades (e.g., Seyhun 1986). These excess returns often relate to important information events, and insiders prefer fewer constraints on their trading around these events. Consistent with this logic, Roulstone

[26] In fact, Camerton-Forde et al. (2010) document that market makers hold net positive inventories 94% of the time.

(2003) argues that insiders, whose trading is restricted around earnings announcements (due to blackout policies), demand higher compensation to offset the lost trading profits from constrained trading. To the extent CEO trading is constrained by halts, we predict firms with information-based CEO trading prefer fewer halts. We also predict firms with CEOs engaged in liquidity trading would have similar, albeit weaker, preferences.

The above arguments are based on the assumption that CEOs prefer fewer constraints on their trading. If CEOs are not inclined to trade around information events, we would expect this constraint to be less important. While we cannot observe whether CEOs want to trade during a halt, we can observe CEOs' actual trading around halts when markets were open. Figure 4 shows the distribution of CEO trades around halts. Because Bettis et al. (2000) document that most firms have blackout periods surrounding earnings announcements, we examine halts associated with earnings announcements separately. Panel A documents a significant spike in CEO trades on the day of the halt suggesting that informed CEOs want to trade around the underlying information event. Alternatively, Panel B shows a substantial delay in CEO trading for the subsample associated with earnings announcements, consistent with blackout period restrictions. These patterns hold for both reactive and proactive halts, but are significantly more pronounced for proactive. Collectively, this evidence shows CEOs trade around halt events suggesting that halts may be a costly constraint to CEO trading. We use two proxies to capture CEO trading behavior. Following Cohen et al (2012), we include indicators for whether the CEO is an opportunistic trader (*CEOOpportunisticTrader*) or a routine trader (*CEORoutineTrader*).

4.2.3 Short Interest

Short sellers are known to be informed traders,[27] but this type of trading is quite risky (Engelberg, Reed, and Ringgenberg, 2017). Given short sellers are betting on poor future performance, they are generally not viewed favorably by firm management. In some cases, firms actually use aggressive techniques "to impede short selling, including legal threats, investigations, lawsuits, and various technical actions intended to create a short squeeze" (Lamont, 2012). As a recent example, short sellers alleged that Tesla "embarked on a scheme… to completely decimate the Company's short-sellers."[28] Halts are one technique whereby firms could impose additional risk on short sellers. If this technique is effective then firms with high short interests would have a stronger preference for halts. We proxy for short interests with the ratio of short positions to the number of shares outstanding (*ShortInterest*).

4.2.4 CEO characteristics

Prior research suggests manager style and networks are important for a wide range of corporate decisions. First, Bertrand and Schoar (2003) document manager style (identified using manager fixed effects and characteristics) matters for a wide range of corporate decisions. For example, they conclude MBAs take more aggressive actions whereas older CEOs take more conservative actions. Second, Perry and Peyer (2005) argue CEOs can learn different strategies and build connections with other firms (i.e., have wider networks) by sitting on outside boards. Exposure to other views and experiences regarding halts likely alters CEO preferences. Ex ante there is no reason to expect CEO characteristics to be correlated with halts unless CEOs have the ability to influence halt decisions and CEO characteristics lead to different halt preferences. While we have

[27] See, for example, Dechow, Hutton, Meulbroek, and Sloan, 2001; Desai, Ramesh, Thiagarajan, and Balachandran, 2002; Boehmer, Huszar, and Jordan 2010; and Drake, Rees, and Swanson, 2011.
[28] Kalman Isaacs vs. Elon Musk and Tesla, Case 3:18-cv-04865 filed 8/10/18 (Northern District of California, San Francisco Division)

no directional predictions, we predict CEO characteristics will be associated with halt outcomes. We include four CEO characteristic proxies based on the prior literature. Following Bertrand and Schoar (2003), we include whether the CEO has an MBA (*CEOMBA*), the CEO's age (*CEOAge*), and how many years the CEO has been in the position (*CEOTenure*). We also include the number of boards on which a CEO serves (*CEOTotBoards*) consistent with Perry and Peyer (2005).

4.3 Indirect economic benefit analysis: empirical design and results

Table 5 presents our tests of whether exchanges are influenced by constituent preferences when calling halts. Given exchange discretion is focused in the proactive halts, we provide two types of evidence. First, we examine whether constituent preferences are associated with proactive halts where discretion is greatest. Second, we examine whether the findings are significantly larger for proactive halts (i.e., those more likely based on judgment) than reactive halts (i.e., those more likely mechanical in nature). Because reactive halts are almost entirely rules driven, they provide an effective control group to ensure that our proxies capture constituent preferences as opposed to simply proxying for expected returns and volatility.

We first provide descriptive evidence on the proxies for constituent preferences for proactive and reactive halts in Panels A and B, respectively. For proactive halts (Panel A), we find significant differences between the halt and no halt samples for five of the eight proxies. Similarly, we find differences for five of the eight for reactive halts (Panel B). However, these tests do not distinguish between constituent preferences and differences in expected returns and volatility, so these results are descriptive in nature. We formally test for the influence of constituent preferences in Panel C where we include controls for expected returns and volatility.[29]

[29] We also include a control for the news magnitude (*AbsExtremeRet*) as prior research suggests that market responses to bad news are larger than responses to good (Kothari et al, 2009).

Column 1 of Panel C provides evidence on our first test. All four of the variables with directional predictions (*GoodNewsIndicator*, *CEOOpportunisticTrader*, *CEORoutineTrader*, and *ShortInterest*) are significantly associated with halts, as expected. These variables are not only statistically significant but economically meaningful. Moving from good to bad news increases the proactive halt probability by 34.2%, having an opportunistic CEO trader decreases the probability by 21.1%, and having a CEO that engages in routine trading decreases the probability by 20.2%.[30] Similarly, when moving across the interquartile range of short interests, the probability increases by 9.3%.[31] We also find all but one (*CEOAge*) of the four proxies without directional predictions are significantly associated with proactive halts.

Column 3 provides evidence on our second test evaluating whether the results from the proactive halt tests (column 1) are significantly greater than those from the reactive halt tests (column 2). Consistent with expectations, the proactive results are significantly greater in the predicted direction for all four constituent preference proxies with directional predictions than the reactive results. We also find the proactive results are significantly greater (in an absolute sense) for all but two (*CEOAge* and *CEOTenure*) of the constituent preference proxies without directional predictions than the reactive results. Collectively, the evidence in Table 5 suggests that exchanges cater to their various constituents when deciding whether or not to call a halt.[32]

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[30] The increase from good to bad news of 34.2% is calculated by dividing the marginal effect (0.0063) by the probability of a good news proactive halt holding all other covariates at their mean (0.0184). Similarly, the decrease in the presence of an opportunistic CEO trader is calculated by dividing the marginal effect (0.0050) by the probability of a proactive halt without an opportunistic CEO trader holding all other covariates at their mean (0.0237). The decrease in the presence of a CEO engaged in routine trading is calculated by dividing the marginal effect (0.0045) by the probability of a proactive halt without such a CEO holding all other covariates at their mean (0.0223).

[31] The probability of a proactive halt at the first (third) quartile of shorts, holding all other covariates at their mean is 1.93% (2.11%). The difference of these two probabilities divided by the first quartile probability yields the 9.3% ((2.11%-1.93%)/1.93%). The interquartile range of short interests is 1.3% to 5.3%.

[32] For robustness, we repeat the analyses in Panel C excluding the BoardEx variables (*CEOMBA, CEOAge, CEOTenure, CEOTotBoards*) to maximize sample size and find consistent results on the remaining variables.

5. Research Question 2: Is the discretion associated with the effectiveness of halts?

We next examine two market consequences and their association with the portion of halt discretion that is not explained by expected returns and volatility. The two market consequences we evaluate are both consistent with a halt being ineffective – the likelihood of a small halt return (i.e., an unnecessary halt or a "miss")[33] and stock return reversals following the halt (i.e., the halt did not result in an efficient re-opening price). We proxy for halt discretion that is unexplained by expected returns and volatility using the residuals from a proactive halt model containing only the control variables in Table 4. The residuals are divided into quartiles with the lowest having the least unexplained discretion.

Table 6 shows the results of regressing the two market consequences on the proxy for unexplained halt discretion. In Panel A, we examine the association between the level of unexplained halt discretion and the likelihood of calling an unnecessary halt (*SmallHaltReturn*).[34] In the first column we include a single variable capturing the quartile ranking (scaled between zero and one) of the unexplained residual (*q(Residual)*). In the second column we include indicators for quartiles 2-4 to compare them to the bottom quartile (lowest unexplained discretion) as a base group. The results in both columns show a positive association between the level of unexplained halt discretion and the likelihood of the exchange calling an unnecessary halt.

In Panel B we examine the association between the unexplained halt discretion and return reversals in the ten minutes after the halt (*PostHaltReturn*). The first column includes the scaled quartile ranking of the unexplained residual (interacted with the return during the halt, *HaltReturn*)

[33] We assume that a small halt window return reflects a lack of updating during the halt window (on average). We do note that it is possible that a near-zero halt return could result from two unobserved and opposite price movements within the halt window, but we expect this situation to be uncommon.

[34] We define *SmallHaltReturn* as halt returns less than 50bp, however, our results are quantitatively similar if we choose the alternative threshold of 1 percent.

and the second column includes indicators for each quartile (interacted with *HaltReturn*). The results are consistent with increasing return reversals post-halt as the amount of unexplained discretion increases.[35] Taken together, the results in Table 6 suggest that more discretionary halts (i.e., those that are unexplained by expected returns and volatility proxies) result in less effective halt outcomes.

6. Conclusion

Stock exchanges exercise discretion when calling trading halts, an important event during our period of study. However, there is limited information on the halt decision. We investigate how exchanges use their discretion and whether the use of discretion alters the effectiveness of halts.

We begin by testing the claim that exchanges hold discretion when calling halts. Ceteris parabis, the use of halts across NYSE and Nasdaq should be similar unless the exchanges use discretion and do so differently. We find strong evidence that the exchanges implement halts differently with Nasdaq having a greater propensity to call halts.

Our study examines two research questions. First, we ask how exchanges use discretion when calling halts. While we do not find support for the importance of a direct economic benefit motivating halts, we find support for indirect economic benefits derived from constituent satisfaction. Collectively, the evidence suggests exchanges cater to their various constituents when deciding whether to call a halt. Second, we ask whether the use of discretion by exchanges is associated with halt effectiveness. We find the level of halt discretion not explained by expected returns and volatility is positively associated with two measures of halt ineffectiveness (small halt returns (i.e., unnecessary halts or a "misses") and larger stock return reversals after the halt), suggesting halts with more unexplained discretion are less effective.

[35] The reversal results are robust to excluding observations where there are small halt returns (*SmallHaltReturn*=1), results untabulated.

To our knowledge this is the first study to identify that exchanges have discretion when calling halts and investigate how they use this discretion. Our study contributes by showing that halt outcomes reflect the preferences of exchange constituents, consistent with critiques in popular press that "exchanges have become beholden to the companies they list" (WSJ, 2018). We also show exchange discretion results in less effective halts, which is especially important given the ongoing regulatory debates about the optimal use of halts. Finally, we contribute by providing a simple strategy to identify the halts most subject to exchange discretion, providing future researchers the ability to identify halt type or level of halt discretion across exchanges.

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Appendix A: Variable Definitions

Trading Halt Variables:

Halt	= 1 if there is an individual stock trading halt, 0 otherwise.
Proactive_Halt	= 1 if there is a proactive-individual stock trading halt, 0 otherwise. We define a halt as proactive if the 5-minute return immediately preceding the halt (calculated using midpoints of the bid-ask spread) is less than 5 percent.
Reactive_Halt	= 1 if there is a reactive-individual stock trading halt, 0 otherwise. We define a halt as reactive if the 5-minute return immediately preceding the halt (calculated using midpoints of the bid-ask spread) is greater than or equal to 5 percent.

Independent Variables of Interest:

NYSE	= 1 if the firm is listed on NYSE, 0 if the firm is listed on Nasdaq.
GoodNewsIndicator	= 1 if the most extreme daily return from the current quarter is positive, 0 otherwise.
CEORoutineTrader	= 1 if the CEO's trading is defined as routine, 0 if the trading is not defined as routine or the CEO does not trade during the 15-month period ending with the current quarter. Following Cohen, Malloy, and Pomorski (2012), we classify a CEO as a routine trader if she trades in the same direction (buy or sell) and the same month for three consecutive years.
CEOOpportunisticTrader	= 1 if the CEO trades stock but does not meet the definition of *CEORoutineTrader*, 0 if *CEORoutineTrader*=1 or the CEO does not trade during the 15-month period ending with the current quarter.
CEOMBA	= 1 if the CEO has an MBA (per BoardEx), 0 otherwise.
CEOAge	= CEO age (per BoardEx).
CEOTenure	= number of years the CEO has been in his position (per BoardEx).
CEOTotBoards	= number of boards the CEO serves on for quoted firms (per BoardEx).
ShortInterest	= Number of short sale positions in the company (as of the end of the prior quarter), scaled by the number of shares outstanding.

Control Variables:

LnMVE	= log (market value of equity as of the end of the prior quarter).
Volume	= volume (in billions of shares) in the prior quarter.
Volatility	= standard deviation of daily stock returns in the prior quarter.
LnNumAnalysts	= log (1 + number of analysts following the firm in the prior quarter)
InstOwn	= the proportion of shares (from 0 to 1) owned by institutional investors as of the end of the prior quarter, calculated using data from Thomson Reuters.

AbsExtremeRet	= the absolute value of the most extreme daily return from the current quarter, where extreme is the largest in magnitude regardless of sign.
AbsQtrRet	= the absolute value of the stock return for the current quarter.
LnNum8Ks	= log (1 + number of 8-Ks filed with the SEC during the current quarter).
MgmtFcst	= 1 if there is a management forecast issued during the current quarter, 0 otherwise.

Market Consequence Variables:

We compute returns based on the midpoint of the bid-ask spread for halts with regular quotes. We exclude observations with spreads more than 100 percent of the midpoint in the window beginning 10-minutes before the halt through 10-minutes after.

HaltReturn	= The stock return over the halt period.
PreHaltReturn	= The stock return in the 10-minutes preceding the halt.
PostHaltReturn	= The stock return in the 10-minutes following the halt.
SmallHaltReturn	= 1 if the *HaltReturn* is less than 50bp, 0 otherwise.
Residual	= the portion of a proactive halt unexplained by expected returns or volatility, calculated as the residual (i.e., one minus the predicted probability) from the logistic model for proactive halts using the control variables in Table 4.

Figure 1: Average number of individual stock trading halts per day
This figure shows the average number of individual stock trading halts, per day, between 2012 and 2015. Panel A shows the results for all single stock halts. Panel B shows the results for the halt sample.

Panel A: All halts

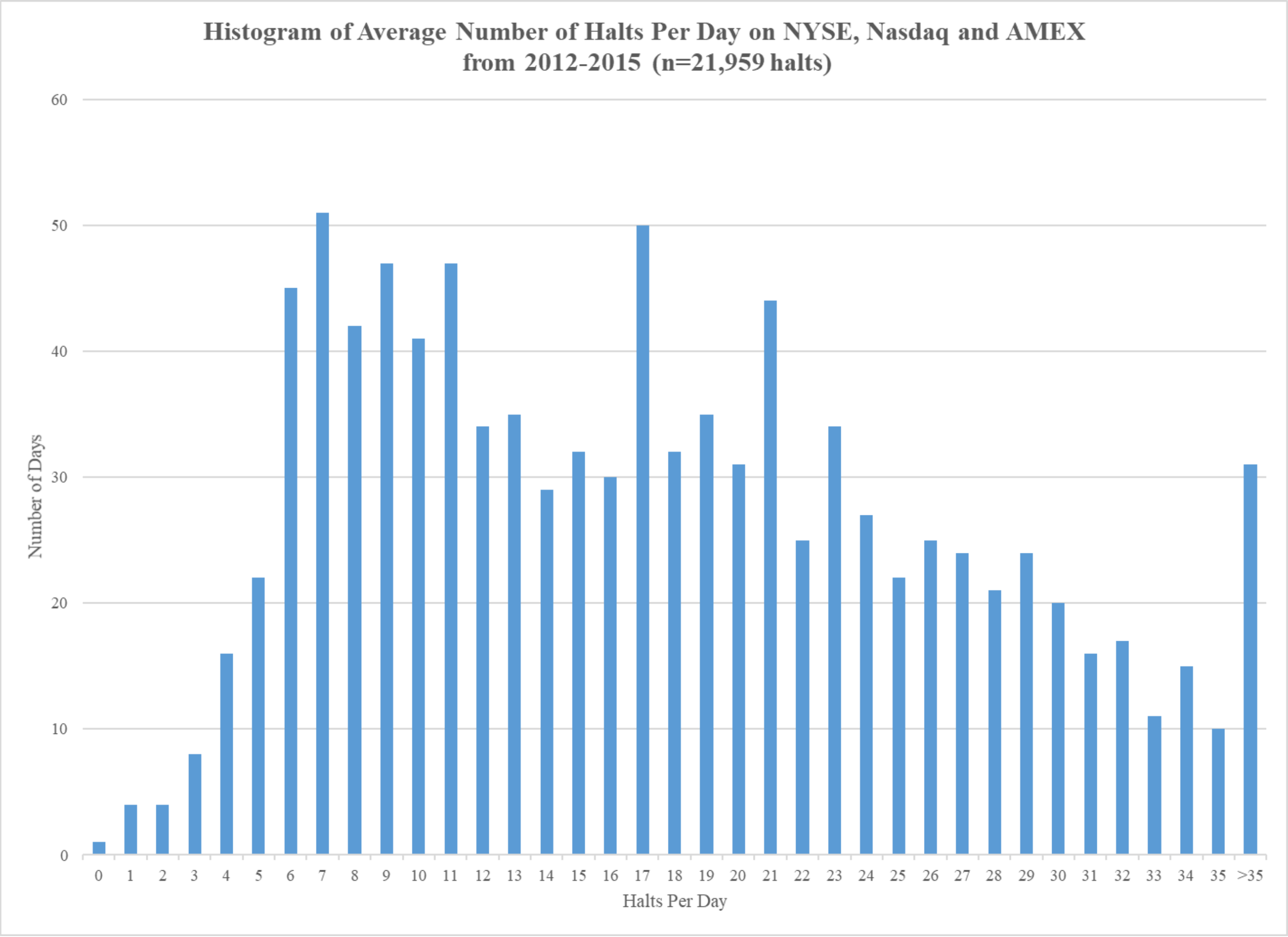


Figure 1 (continued)

Panel B: Sample halts

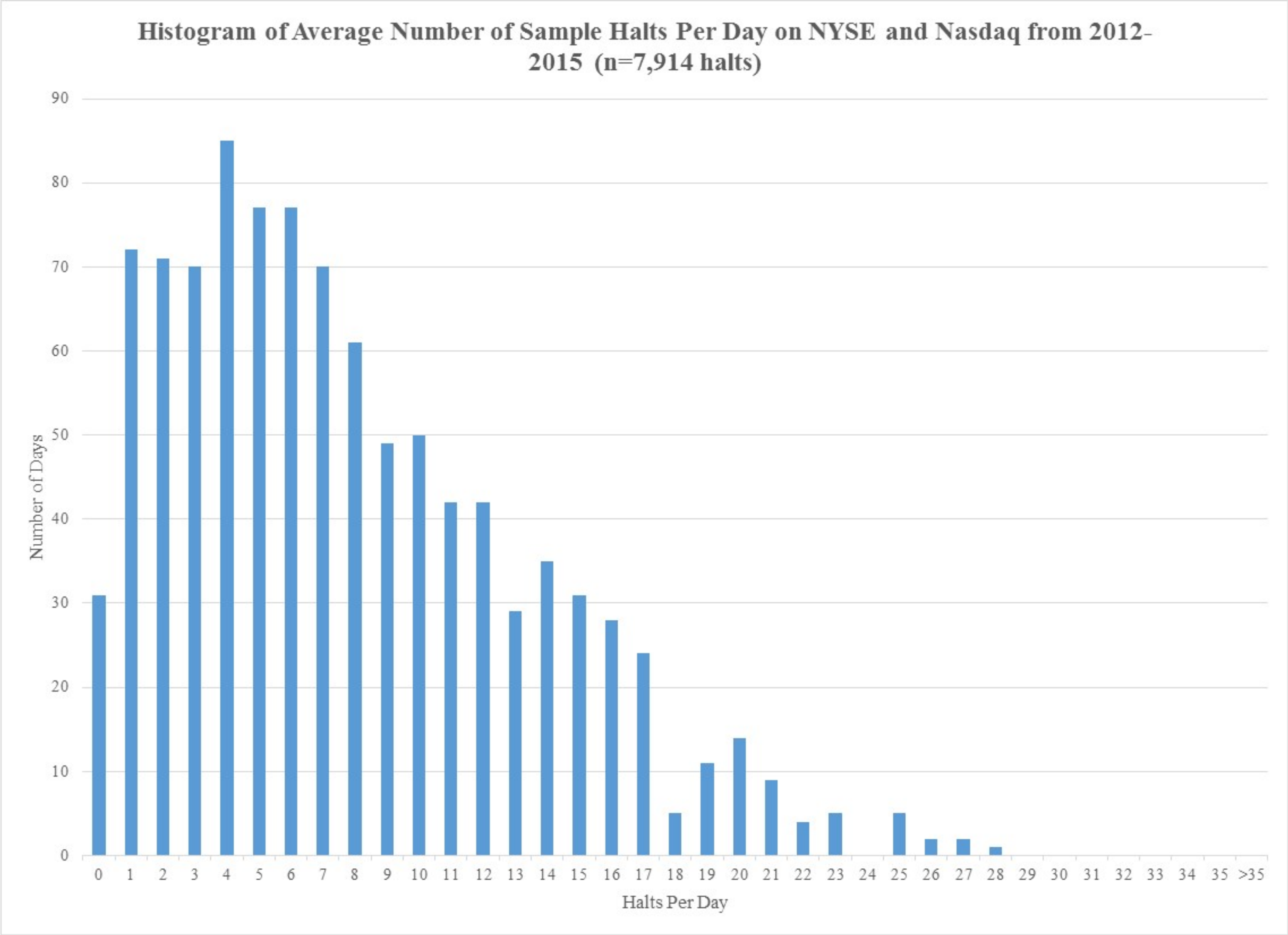


Figure 2: Percent of traded firms halted
This figure shows the percent of listed firms on NYSE and Nasdaq that have halts each quarter between January 1, 2012 and December 31, 2015 for the halts sample as well as the proactive and reactive subsamples.

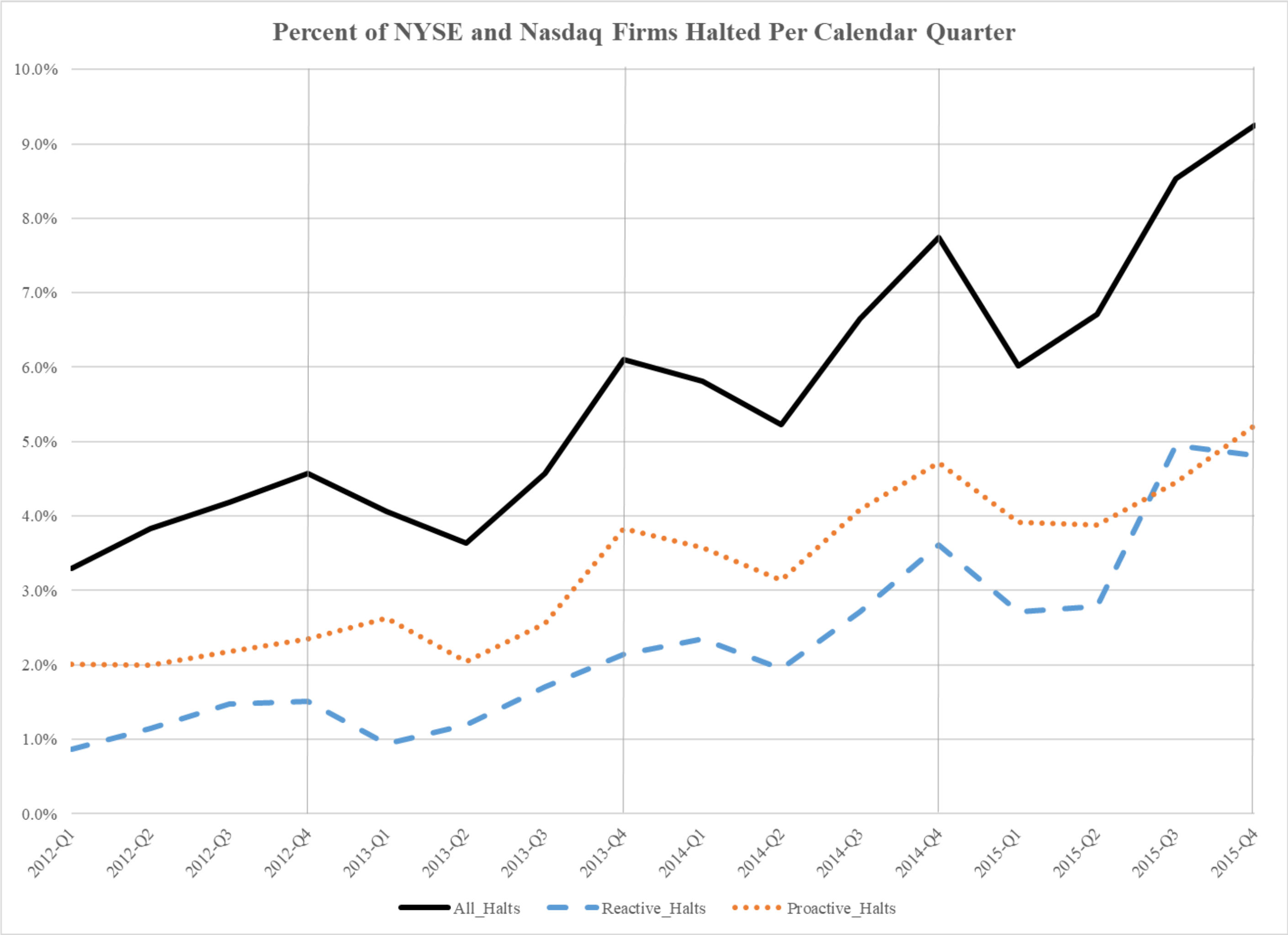
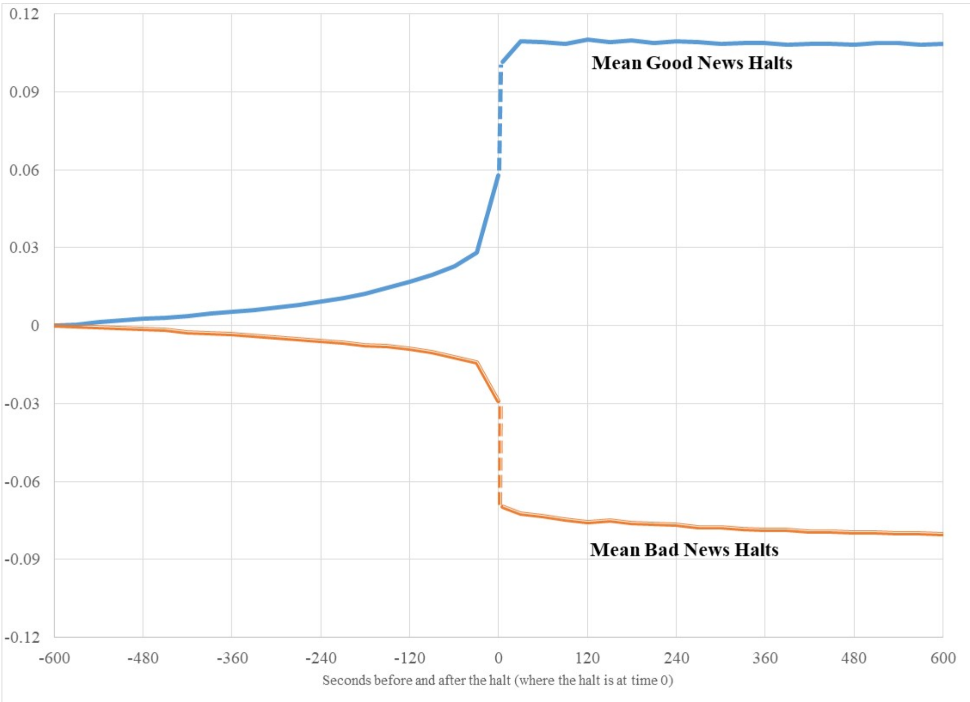


Figure 3: Returns surrounding halts

These figures plot the 30 second returns for the 10 minutes before the halt and 10 minutes following the halt. We compute returns based on the midpoint of the bid-ask spread for halts with regular quotes and spreads less than 100 percent of the midpoint during this window (n=4,824 halts). Panel A provides the returns for all halts while Panel B partitions proactive and reactive halts. Halts are partitioned into proactive (reactive) if the 5-minute return immediately preceding the halt is less than (greater than or equal to) 5 percent. Good (bad) news halts as those observations where the return 10 minutes on either side of the halt is greater than (less than or equal to) zero.

Panel A: All halts



Panel B: Proactive and reactive halts

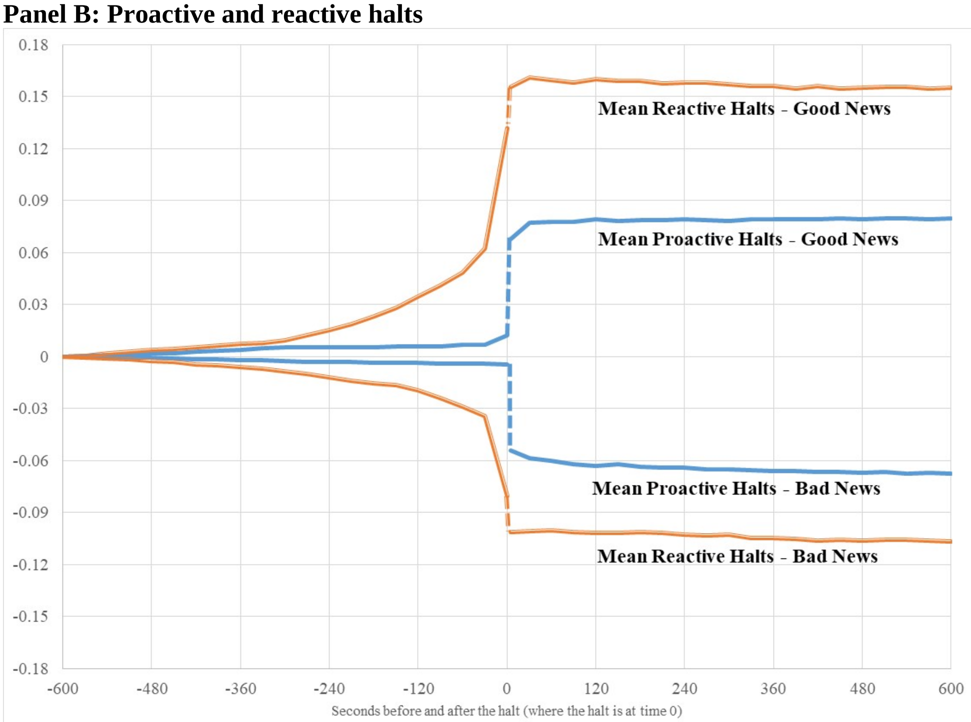
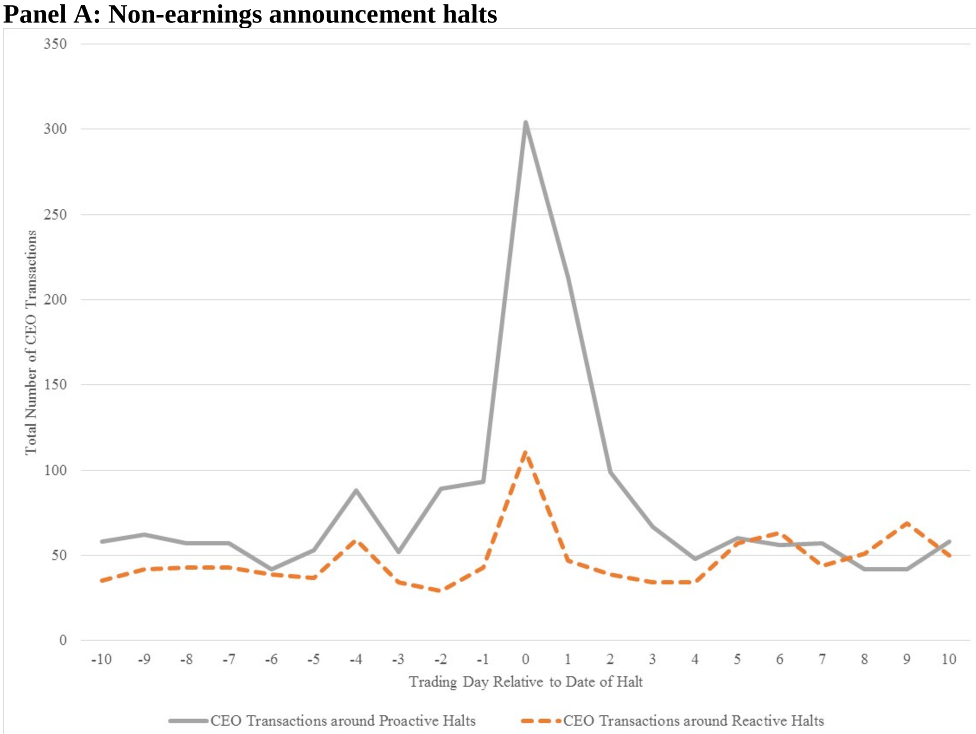


Figure 4: CEO Trading Around Halts
These figures plot the number of CEO trades (e.g., buying and selling events) from 10 trading days before the halt to 10 trading days after. Panel A plots the CEO transactions for halts that do not have an earnings announcement within one trading day of the halt. Panel B plots the CEO transactions for halts that have an earnings announcement within one trading day of the halt. The solid (dashed) line plots CEO transactions surrounding proactive (reactive) halts.

Panel A: Non-earnings announcement halts



Panel B: Earnings announcement halts

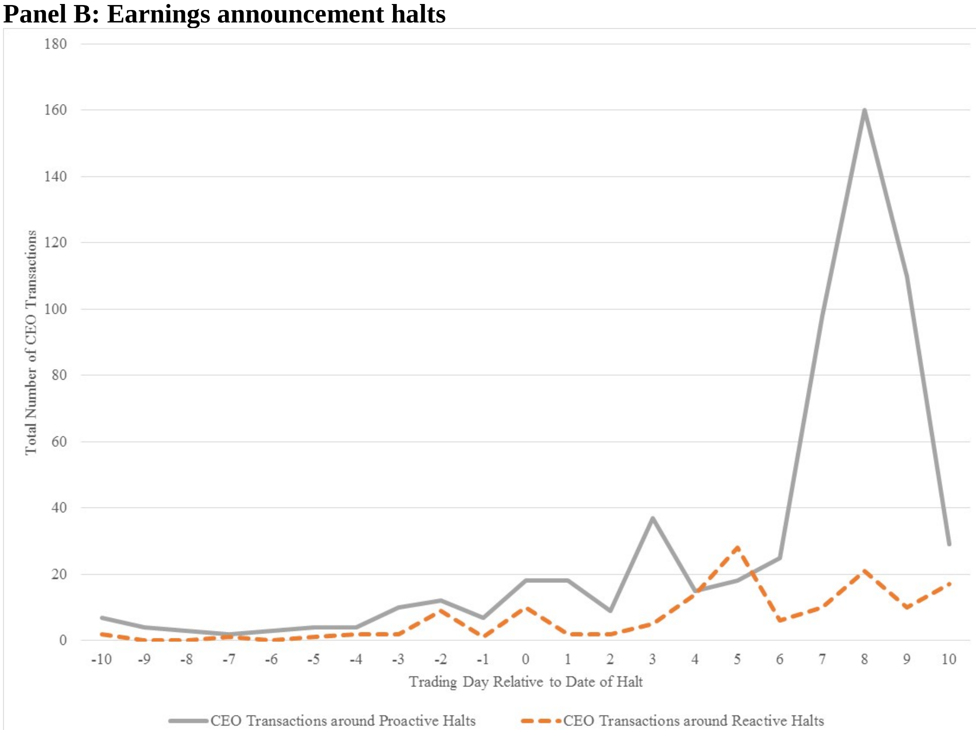


Table 1: Halt identification and halt descriptives
This table shows details on the halts that we identify during the sample period (2012-2015). Panel A shows how we arrive at the sample of individual stock trading halts and the unique firms (unique TAQ symbols) that underlies the sample. Panel B provides descriptive statistics on these individual firm halts.

Panel A: Halt identification

	Halt Observations	*Unique Symbols*
Total distinct NYSE/Nasdaq/AMEX Halts identified in TAQ [(1)]	27,787	5,625
Less: halts on days with extreme halt activity (i.e., exchange-wide halts) [(2)]	(5,828)	(1,298)
All Individual Stock Trading Halts	21,959	4,327
Less: halts without CUSIP/Company identification information in TAQ	(2,006)	(119)
Less: halts without a successful merge to CRSP	(6,935)	(600)
Less: halts that relate to securities other than common stock or ADRs (i.e., only include SHRCD=10, 11, 12, 30, 31)	(1,205)	(516)
Less: halts without a successful merge to COMPUSTAT (or no available CIK)	(449)	(40)
Less: halts with trading during the halt	(1,612)	(490)
Restrict to one halt per day (select first halt with 5-min preceding returns)	(1,347)	0
Less: AMEX Halts	(491)	(171)
Sample Individual Stock Trading Halts	7,914	2,391

Panel B: Halt descriptives

	N	Mean	25th	Median	75th	StdDev
Halt Duration (in minutes)	*7,914*	101.019	5.000	6.774	36.142	233.947
2 day Absolute Return (begin close before halt)	*7,374*	10.9%	1.3%	4.6%	12.8%	16.8%
Good News Indicator (2 trading day return)	*7,374*	0.499	0.000	0.000	1.000	0.500
Absolute Return 10 minutes before halt begins	*4,888*	6.3%	0.5%	2.7%	8.6%	8.7%
Absolute Return during the halt (halt to resume)	*4,888*	6.6%	1.0%	3.2%	7.7%	9.6%
Absolute Return 10 minutes after trading resumes	*4,888*	4.0%	0.3%	1.9%	5.6%	5.4%

Other Notes:
[(1)] Halts beginning in the same 5-second window on different Nasdaq exchanges (i.e., exchange codes “T”, “B”, and “X”) are considered to be the same halt.
[(2)] Halts on dates with more than 1,000 halts in the day are excluded. This consisted of four dates: 3/25/13, 8/22/13, 11/22/13, and 8/24/15. No other dates had 200 or more halts. Media reports acknowledge exchange-wide shutdowns on 8/22/13 and 8/24/15 (see for example: http://www.reuters.com/article/us-nasdaq-halt-tapec-idUSBRE97L0V420130822 and http://money.cnn.com/2015/08/24/investing/stocks-markets-selloff-circuit-breakers-1200-times/)

Table 2: Sample selection
This table shows the sample selection details, both at the firm-quarter and unique firm (based on PERMNO) levels, for the primary sample used in this study.

	Firm Quarters	*Unique Firms*
CRSP Firm Quarters with MVE available at end of calendar quarter	109,939	8,723
Less: observations where MVE is missing at end of prior calendar quarter	(2,151)	(124)
Less: observations that relate to securities other than common stock or ADRs (i.e., only include SHRCD=10, 11, 12, 30, 31)	(36,337)	(2,974)
Less: observations with missing CIKs in Compustat merge	(653)	(42)
Less: AMEX observations (exchcd=2)	(4,338)	(170)
Total firm quarters	66,460	5,413
Total firm quarters with halts	3,764	
Percent of firm quarters with halts	5.66%	

Table 3: Halt classification and descriptive statistics of proactive and reactive halts

This table provides details of our halt classification scheme to categorize halts as proactive and reactive. Panel A demonstrates the classification scheme and provides the TAQ quote code for reference purposes. Proactive and reactive halts are defined based on the 5-minute return preceding the halt, where those with returns less than (greater than or equal to) 5 percent are coded as proactive (reactive). We code observations where the 5-minute return is not calculable as missing (i.e., they are left out of the total classifiable observations count). Panel B provides univariate statistics to across proactive and reactive halts.

Panel A: Halt classification

	Quote Condition Code (TAQ Description)									
	NYSE						***NASDAQ***			
	"D" or "P" News Dissemination or News Pending		**"I"** Order Imbalance		**"M"** Additional Information		**"N"** Non-Firm Quote		**Total**	
All Halts	366		469		239		6,840		7,914	
Classification of Halts										
Reactive Halts	23	8%	125	32%	193	84%	2,519	45%	2,860	44%
Proactive Halts	265	92%	262	68%	37	16%	3,072	55%	3,636	56%
Classified Halts	288	100%	387	100%	230	100%	5,591	100%	6,496	100%
Unable to Classify (No Returns Info)	78		82		9		1,249		1,418	
Total Halts	366		469		239		6,840		7,914	

Panel B: Univariate statics across proactive and reactive halts

	Proactive Halts			Reactive Halts			Test of Difference (p-values)	
	n	Mean	Median	*n*	Mean	Median	Mean	Median
Halt Duration (in minutes)	*3,636*	80.680	10.750	*2,860*	53.777	5.085	<0.01	<0.01
2 day Absolute Return (begin close before halt)	*3,463*	8.91%	4.17%	*2,736*	12.76%	5.65%	<0.01	<0.01
Good News Indicator (2 trading day return)	*3,463*	0.485	0.000	*2,736*	0.510	1.000		0.06
Absolute Return 10 minutes before halt begins	*3,143*	1.84%	0.94%	*1,745*	14.21%	11.18%	<0.01	<0.01
Absolute Return during the halt (halt to resume)	*3,143*	6.51%	2.74%	*1,745*	6.84%	3.90%	0.23	<0.01
Absolute Return 10 minutes after trading resumes	*3,143*	3.63%	1.40%	*1,745*	4.72%	2.93%	<0.01	<0.01

Table 4: Tests evaluating exchange halt discretion

This table examines whether NYSE and Nasdaq make different halting decisions, controlling for listing firm characteristics and information content. Panel A provides descriptive statistics and univariate tests across the halt (*Halt*) and no-halt samples. Panel B provides descriptive statistics and univariate tests across the NYSE and Nasdaq samples. Tests of differences are based on two-sided t-tests for means, Wilcoxon rank-sum tests for medians, and χ^2 tests for binary variables. Panel C provides multivariate logistic regressions of halts on the exchange indicator *(NYSE)*. Column (1) presents the results with control variables, time and industry fixed effects. Column (2) presents the results after entropy balancing the NYSE and Nasdaq samples based on the control variables and fixed effects in Column (1) across three moments (mean, variance, and skewness). Column (3) presents the results for proactive halts after entropy balancing, as in Column (2). Column (4) presents the entropy-balanced results for reactive halts. Column (5) tests the differences between Columns (3) and (4) using seemingly unrelated regression techniques for a linear probability model. Time fixed effects use quarter-years and industry fixed effects use 2-digit SIC codes. Variable definitions provided in Appendix A. Regression marginal effects are calculated holding all other covariates at the sample mean. Standard errors are Huber/White robust estimators clustered by firm.

Panel A: Univariate Statistics across Halt and Non-Halt Firm Quarters

	Halt=1 (n= 3,764)		*Halt=0* (n= 62,696)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
$NYSE_t$	0.2067	0.0000	0.4346	0.0000		<0.01
$LnMVE_{t-1}$	5.4944	5.3478	6.5709	6.5430	<0.01	<0.01
$Volume_{t-1}$	0.0516	0.0072	0.0642	0.0170	<0.01	<0.01
$Volatility_{t-1}$	0.0404	0.0336	0.0246	0.0204	<0.01	<0.01
$LnNumAnalysts_{t-1}$	1.2009	1.0986	1.6670	1.7918	<0.01	<0.01
$InstOwn_{t-1}$	0.4002	0.3494	0.5163	0.5642	<0.01	<0.01
$AbsExtremeRet_t$	0.1771	0.1357	0.0916	0.0686	<0.01	<0.01
$AbsQtrRet_t$	0.2246	0.1667	0.1483	0.1040	<0.01	<0.01
$LnNum8Ks_t$	1.1545	1.3863	1.1028	1.0986	<0.01	<0.01
$MgmtFcst_t$	0.3329	0.0000	0.4813	0.0000		<0.01

Panel B: Univariate Statistics across NYSE and Nasdaq Firm Quarters

	NYSE=1 (n= 28,028)		*NYSE=0* (n= 38,432)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
$Halt_t$	0.0278	0.0000	0.0777	0.0000		<0.01
$LnMVE_{t-1}$	7.6268	7.6578	5.6954	5.6042	<0.01	<0.01
$Volume_{t-1}$	0.0975	0.0379	0.0387	0.0080	<0.01	<0.01
$Volatility_{t-1}$	0.0209	0.0177	0.0289	0.0240	<0.01	<0.01
$LnNumAnalysts_{t-1}$	2.0426	2.1972	1.3475	1.3863	<0.01	<0.01
$InstOwn_{t-1}$	0.5876	0.6798	0.4530	0.4398	<0.01	<0.01
$AbsExtremeRet_t$	0.0758	0.0581	0.1115	0.0831	<0.01	<0.01
$AbsQtrRet_t$	0.1334	0.0975	0.1666	0.1151	<0.01	<0.01
$LnNum8Ks_t$	1.0652	1.0986	1.1353	1.0986	<0.01	<0.01
$MgmtFcst_t$	0.5790	1.0000	0.3956	0.0000		<0.01

Table 4 (continued)

Panel C: Multivariate logistic regressions

Dependent Variable:	***$Halt_t$***		***$Halt_t$***		***$Proactive\_Halt_t$***		***$Reactive\_Halt_t$***		
Sample:	***Pooled***		***Entropy-Balanced [all covariates in (1)]***		***Entropy-Balanced [all covariates in (1)]***		***Entropy-Balanced [all covariates in (1)]***		
	(1)		(2)		(3)		(4)		*Test (3) - (4) = 0*
	Margin	*z-stat*	Margin	*z-stat*	Margin	*z-stat*	Margin	*z-stat*	*p-value*
$NYSE_t$	-0.0198	*-7.85* ***	-0.0131	*-4.06* ***	-0.0075	*-3.28* ***	-0.0017	*-0.97*	*<0.01*
Prior Quarter Control Variables									
$LnMVE_{t-1}$	0.0003	*0.30*							
$Volume_{t-1}$	0.0251	*2.38* **							
$Volatility_{t-1}$	0.1593	*1.49*							
$LnNumAnalysts_{t-1}$	-0.0105	*-6.60* ***							
$InstOwn_{t-1}$	0.0046	*1.20*							
Current Quarter Control Variables									
$AbsExtremeRet_t$	0.2103	*12.46* ***							
$AbsQtrRet_t$	0.0040	*0.92*							
$LnNum8Ks_t$	0.0043	*2.68* ***							
$MgmtFcst_t$	-0.0030	*-1.36*							
Fixed Effects	*Time, Industry*		*No*		*No*		*No*		
Psuedo R-Square	*0.126*		*0.004*		*0.004*		*0.001*		
Area under ROC	*0.767*		*NA*		*NA*		*NA*		
N	*66,267*		*66,308*		*65,863*		*66,308*		

Table 5: Tests evaluating halts and constituent preferences

This table provides details on the tests of whether constituent preferences are associated with halts. Panel A (Panel B) provides descriptive statistics and univariate tests for proactive (reactive) halts. Tests of differences are based on two-sided t-tests for means, Wilcoxon rank-sum tests for medians, and χ^2 tests for binary variables. Panel C provides multivariate logistic regressions. Column (1) examines the association between proactive halts and the constituent preference proxies. Column (2) examines the association between reactive halts and the constituent preference proxies. Column (3) tests the differences between Columns (1) and (2) using seemingly unrelated regression techniques for a linear probability model. Time fixed effects use quarter-years and industry fixed effects use 2-digit SIC codes. Variable definitions provided in Appendix A. Regression marginal effects are calculated holding all other covariates at the sample mean. Regression standard errors are Huber/White robust estimators clustered by firm.

Panel A: Univariate Statistics across Proactive Halt and Non-Proactive Halt Firm Quarters

	Proactive_Halt=1 (n= 1,413)		*Proactive_Halt=0* (n= 45,778)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
$GoodNewsIndicator_t$	0.5718	1.0000	0.5861	1.0000		0.28
$CEOOpportunisticTrader_t$	0.5223	1.0000	0.5306	1.0000		0.54
$CEORoutineTrader_t$	0.2229	0.0000	0.3055	0.0000		<0.01
$ShortInterest_{t-1}$	0.0607	0.0241	0.0461	0.0260	<0.01	<0.01
$CEOMBA_t$	0.3234	0.0000	0.3712	0.0000		<0.01
$CEOAge_t$	56.3340	56.0000	56.5108	56.0000	0.38	0.09
$CEOTenure_t$	5.4116	2.9000	5.3057	3.5000	0.48	0.01
$CEOTotBoards_t$	2.1621	1.0000	2.0785	2.0000	0.05	0.42

Panel B: Univariate Statistics across Reactive Halt and Non-Reactive Halt Firm Quarters

	Reactive_Halt=1 (n= 884)		*Reactive_Halt=0* (n= 46,307)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
$GoodNewsIndicator_t$	0.6278	1.0000	0.5848	1.0000		0.01
$CEOOpportunisticTrader_t$	0.5373	1.0000	0.5302	1.0000		0.68
$CEORoutineTrader_t$	0.1742	0.0000	0.3055	0.0000		<0.01
$ShortInterest_{t-1}$	0.0409	0.0090	0.0466	0.0262	<0.01	<0.01
$CEOMBA_t$	0.3609	0.0000	0.3699	0.0000		0.58
$CEOAge_t$	56.5249	56.0000	56.5051	56.0000	0.94	0.71
$CEOTenure_t$	5.1740	2.4000	5.3115	3.5000	0.47	<0.01
$CEOTotBoards_t$	2.1063	1.0000	2.0805	2.0000	0.63	<0.01

Table 5 (continued)

Panel C: Multivariate logistic regressions

Dependent Variable:		***$Proactive\_Halt_t$***			***$Reactive\_Halt_t$***			***Test (1) - (2) = 0***
		(1)			(2)			(3)
	Pred	Margin	*z-stat*		Margin	*z-stat*		*p-value*
Constituent Preference Variables								
$GoodNewsIndicator_t$	(-)	-0.0063	*-4.98*	***	-0.0022	*-2.63*	***	*<0.01*
$CEOOpportunisticTrader_t$	(-)	-0.0050	*-2.73*	***	-0.0010	*-0.96*		*0.03*
$CEORoutineTrader_t$	(-)	-0.0045	*-2.00*	**	-0.0010	*-0.75*		*0.04*
$ShortInterest_{t-1}$	(+)	0.0463	*5.50*	***	-0.0061	*-0.69*		*<0.01*
$CEOMBA_t$	(+/-)	-0.0031	*-2.07*	**	0.0006	*0.63*		*<0.01*
$CEOAge_t$	(+/-)	0.0000	*-0.36*		0.0000	*0.43*		*0.30*
$CEOTenure_t$	(+/-)	0.0003	*1.85*	*	0.0002	*2.06*	**	*0.62*
$CEOTotBoards_t$	(+/-)	0.0013	*2.79*	***	0.0005	*1.69*	*	*0.09*
Prior Quarter Control Variables								
$LnMVE_{t-1}$		-0.0001	*-0.16*		-0.0005	*-1.28*		
$Volume_{t-1}$		0.0232	*3.07*	***	0.0093	*2.32*	**	
$Volatility_{t-1}$		0.1314	*1.36*		0.2548	*4.81*	***	
$LnNumAnalysts_{t-1}$		-0.0069	*-5.37*	***	-0.0050	*-7.20*	***	
$InstOwn_{t-1}$		-0.0025	*-0.78*		-0.0003	*-0.13*		
Current Quarter Control Variables								
$NYSE_t$		-0.0102	*-4.54*	***	0.0010	*0.80*		
$AbsExtremeRet_t$		0.0827	*5.37*	***	0.0276	*3.19*	***	
$AbsQtrRet_t$		-0.0045	*-1.13*		-0.0021	*-0.94*		
$LnNum8Ks_t$		0.0003	*0.22*		-0.0008	*-0.90*		
$MgmtFcst_t$		0.0021	*1.14*		-0.0002	*-0.25*		
Fixed Effects		*Time, Industry*			*Time, Industry*			
Psuedo R-Square		*0.096*			*0.167*			
Area under ROC		*0.748*			*0.808*			
N		*46,441*			*44,837*			

Table 6: Market consequences associated with unexplained discretion
This table provides details on the tests of market consequences associated with unexplained discretion. Panel A provides multivariate logistic regressions to examine the association between small halt returns and the level of unexplained halt discretion. Panel B provides multivariate regressions to examine the association between post-halt stock return reversals and the level of unexplained halt discretion. We proxy for unexplained halt discretion using the residual (i.e., one minus the predicted probability) from a proactive halt model containing the control variables in Table 4; *q(Residual)* is the quartile (scaled between zero and one) of this residual; *qN-Residual* is a dummy variable set to one if the residual is in the Nth quartile. This analysis uses all proactive halts with available stock return data. Variable definitions provided in Appendix A. Regression marginal effects are calculated holding all other covariates at the sample mean. Standard errors are Huber/White robust estimators clustered by firm.

Panel A: Small halt return tests

Dependent Variable: $SmallHaltReturn_t$	(1)			(2)		
	Margin	*z-stat*		Margin	*z-stat*	
Primary Variable(s)						
$q(Residual_t)$	0.0766	*2.25*	**			
$q2\text{-}Residual_t$				-0.0045	*-0.14*	
$q3\text{-}Residual_t$				0.0219	*0.73*	
$q4\text{-}Residual_t$				0.0781	*2.10*	**
Psuedo R-Square	*0.005*			*0.006*		
Area under ROC	*0.550*			*0.552*		
N	*2,923*			*2,923*		

Panel B: Stock return reversal tests

Dependent Variable: $PostHaltReturn_t$	(1)			(2)		
	Coef.	*t-stat*		Coef.	*t-stat*	
Primary Variable(s)						
$HaltReturn_t$	-0.0187	*-0.74*				
$q(Residual_t)$ x $HaltReturn_t$	-0.2408	*-5.83*	***			
$q1\text{-}Residual_t$ x $HaltReturn_t$				-0.0171	*-0.62*	
$q2\text{-}Residual_t$ x $HaltReturn_t$				-0.1196	*-2.78*	***
$q3\text{-}Residual_t$ x $HaltReturn_t$				-0.1457	*-3.62*	***
$q4\text{-}Residual_t$ x $HaltReturn_t$				-0.2732	*-8.73*	***
Control Variable(s)						
$PreHaltReturn_t$	-0.0620	*-1.37*		-0.0629	*-1.39*	
Adjusted R-Square	*0.074*			*0.074*		
N	*2,923*			*2,923*		

Internet Appendix – Robustness to alternative sample using 8-K filings

A1. Sample

For robustness we perform the primary analyses using a sample based on 8-K filings. As halts result from material information (actual or rumor-based) and the SEC requires firms to file 8-Ks to "announce major events," we examine when 8-Ks are associated with halts.[36] For each halt, we determine whether there was an 8-K on the day of or day prior to the halt.[37] When multiple 8-Ks are filed in this window, we choose the 8-K closest to the halt. The remaining unmatched 8-K filings comprise the no-halt sample.

Table A1 provides details on sample selection. The sample begins with the population of 8-Ks filed with the SEC from 2012-2015, downloaded from EDGAR using Python. We then use Python to obtain acceptance dates and times, 8-K line item types, company identification information, and other details. This procedure results in 298,695 8-K filings. We again apply similar filters to those used for the halt sample (merge to Compustat/CRSP/TAQ, drop ETFs, drop AMEX) and require the observations to have non-missing two-day returns surrounding the 8-K filing date (the returns window begins at the market close preceding the 8-K acceptance) and prior quarter controls. This results in 168,187 8-Ks across 4,189 firms. Finally, we merge the resulting sample with the halt sample by matching 8-Ks to a halt on the day of or the day after the 8-K acceptance date. In the event that a halt is matched to multiple 8-Ks, we select the match with the closest proximity between the 8-K acceptance date/time and the time the halt begins (i.e., the closest 8-K is coded as a halt, whereas the other 8-Ks are coded as no halt). This results in 1,513 halt 8-Ks.

[36] See https://www.sec.gov/fast-answers/answersform8khtm.html as of 4/13/2017.
[37] The flexible matching allows for the possibility that filings occurring late in the day may affect trading early in the following day.

A2. Asymmetry in halts based on the direction of underlying news

Table A2 parallels the results of Table 4, but uses the 8-K sample. The univariate results in Panel A show differences between the halt and no-halt samples for the exchange listing and control variables. Similar to the firm-quarter sample, a smaller proportion of NYSE 8-Ks are associated with halts. NYSE observations (*NYSE*) represent 42% of the no-halt sample but only 24% of the halt sample, suggesting Nasdaq has a greater propensity to call halts. Also consistent with the firm-quarter sample, the absolute return surrounding the 8-K is significantly larger for filings associated with halts than those not associated with halts. For the 8-K sample, we use *AbsEventRet*, which equals the two-day return from the day of the 8-K through the day following. This window should capture the "news" surrounding the halt event regardless of whether the halt occurs before the news (e.g., a proactive halt) or after (e.g., a reactive halt).

Panel B provides details on the most frequent 8-K topics in the sample. There are 18 topics (out of 31 possible) that are associated with halt events. As each 8-K can have more than one topic, we tabulate the percent of halts associated with each topic, such that the percentages across topics exceed 100%. Five topics are associated with at least 5% of the halt events. The two most frequent topics are Financial Statements and Exhibits (*I901*) and Results of Operations and Financial Condition (*I202*) that are associated with 85% and 46% of the sample, respectively.

Panel C shows univariate tests across NYSE and Nasdaq for the 8-K sample. Of primary interest, Nasdaq stocks are 2.4 times more likely to be halted than NYSE stocks (1.2% of firm quarters versus 0.5%). In addition, NYSE and Nasdaq listed firms differ on all characteristics and events shown, similar to the firm-quarter sample.

Panel D shows the logistic regression results of our tests of whether NYSE and Nasdaq call halts differently. While we include the same prior quarter controls as in Table 4, we replace the current quarter controls with a series of event window control variables. As noted above, to capture the likely news associated with the halt, we control for the two-day event return (*AbsEventReturn*) rather than the most extreme return of the quarter. We also include indicators for whether the filing was made during market hours (*MktHoursIndicator*) and the most frequent 8-K topics. The results in Panel D provide evidence consistent with those in Table 4 that exchanges have discretion when calling halts and use it differently.

A3. Differential use of halts across exchanges

The analyses in Table A3 parallel those of Table 5 using the 8-K sample. Panel A provides the univariate tests of proactive halts for the proxies of constituent preferences. Panel B provides the same tests for the reactive halts.

We formally test whether proactive halt decisions are associated with constituent preferences in Panel C. Similar to the firm-quarter tests, *EventGoodNewsIndicator, CEOOpportunisticTrader,* and *ShortInterest* are significantly associated with halts (Column 1), as expected. Further, the proactive results are significantly greater (in an absolute sense) for each of these variables (Column 3). However, we do not find significant associations between proactive halts and *CEORoutineTrader* or for the four proxies without directional predictions. Collectively, the evidence in Table A3 further supports that exchanges cater to their various constituents when deciding whether or not to call a halt.[38]

A4. Results for proactive and reactive halts

The analyses in Table A4 parallel those of Table 6 using the 8-K sample. This table examines the association between unexplained halt discretion and ineffective halt outcomes. We examine likelihood of calling an unnecessary halt (*SmallHaltReturn*) in Panel A and return reversals in the

[38] For robustness, we repeat the analyses in Panel C excluding the BoardEx variables (*CEOMBA, CEOAge, CEOTenure, CEOTotBoards*) to maximize sample size and find consistent results on the remaining variables.

ten minutes after the halt (*PostHaltReturn*) in Panel B. We proxy for halt discretion that is unexplained by expected returns and volatility using the residuals from a proactive halt model containing only the control variables in Table A2. Consistent with the firm-quarter findings in Table 6, the results here suggest more discretionary halts (i.e., those that are unexplained by firm information or fundamentals) result in less effective halt outcomes (i.e., more small halt returns and greater post-halt return reversals).

Table A1: Sample selection (8-K sample)
This table shows the sample selection details, both at the 8-K and unique firm (based on CIK) levels, for the alternative sample used for robustness in this study.

	#8-Ks	*Unique Firms*
8-Ks filed on EDGAR 2012-2015	298,695	11,094
Less: observations without a CIK merge to Compustat	(44,343)	(3,944)
Less: observations without a CRSP merge	(49,904)	(2,074)
Less: observations with missing returns surrounding 8-K filing date	(4,725)	(49)
Less: observations without a link to TAQ	(70)	0
Less: observations that relate to securities other than common stock or ADRs (i.e., only include SHRCD=10, 11, 12, 30, 31)	(19,894)	(530)
Less: observations with missing prior quarter controls	(2,539)	(62)
Less: AMEX observations (exchcd=2)	(9,033)	(246)
Total 8-Ks	168,187	4,189
Total 8-Ks with halts	1,513	
Percent of 8-Ks with halts	0.90%	

Table A2: Tests evaluating exchange halt discretion (8-K sample)
This table examines whether NYSE and Nasdaq make different halting decisions, controlling for listing firm characteristics and information content, using the 8-K sample. Panel A provides descriptive statistics and univariate tests across the halt (*Halt*) and no-halt samples. Panel B shows the details on the 8-K topics associated with trading halts. *Pct of Total* is the percent of filings that include the given topic (percents sum to greater than 100% as some filings include more than one topic). Panel C provides descriptive statistics and univariate tests across the NYSE and Nasdaq samples. Tests of differences are based on two-sided t-tests for means, Wilcoxon rank-sum tests for medians, and χ^2 tests for binary variables. Panel D provides multivariate logistic regressions of halts on the exchange indicator *(NYSE)*. Column (1) presents the results with control variables, time and industry fixed effects. Column (2) presents the results after entropy balancing the NYSE and Nasdaq samples based on the control variables and fixed effects in Column (1) across three moments (mean, variance, and skewness). Column (3) presents the results for proactive halts after entropy balancing, as in Column (2). Column (4) presents the entropy-balanced results for reactive halts. Column (5) tests the differences between Columns (3) and (4) using seemingly unrelated regression techniques for a linear probability model. Time fixed effects use quarter-years and industry fixed effects use 2-digit SIC codes. Variables defined in Internet Appendix Variable Definitions following the tables. Regression marginal effects are calculated holding all other covariates at the sample mean. Standard errors are Huber/White robust estimators clustered by firm.

Panel A: Univariate statistics across Halt and Non-Halt 8-Ks

	Halt=1 (n= 1,513)		*Halt=0* (n= 166,674)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
$NYSE_t$	0.2366	0.0000	0.4235	0.0000		<0.01
$LnMVE_{t-1}$	6.1085	6.1422	6.8020	6.7727	<0.01	<0.01
$Volume_{t-1}$	0.0786	0.0181	0.0884	0.0233	0.04	<0.01
$Volatility_{t-1}$	0.0387	0.0312	0.0254	0.0204	<0.01	<0.01
$LnNumAnalysts_{t-1}$	1.6050	1.7918	1.8185	1.9459	<0.01	<0.01
$InstOwn_{t-1}$	0.5357	0.5783	0.5777	0.6407	<0.01	<0.01
$AbsEventRet_t$	0.0961	0.0818	0.0365	0.0214	<0.01	<0.01
$MktHoursIndicator_t$	0.1851	0.0000	0.2223	0.0000		<0.01

Table A2 (continued)

Panel B: Frequency of 8-K topics associated with trading halts

		Halt=1 (n= 1,513)		*Halt=0* (n= 166,674)	
Line #	*Line Description*	Frequency	Pct of Total	Frequency	Pct of Total
I901	*Financial Statements and Exhibits*	1,284	84.9%	123,510	74.1%
I202	*Results of Operations and Financial Condition*	689	45.5%	51,358	30.8%
I801	*Other Events*	470	31.1%	38,871	23.3%
I701	*Regulation FD Disclosure*	304	20.1%	31,509	18.9%
I101	*Entry into a Material Definitive Agreement*	232	15.3%	19,979	12.0%
I302	*Unregistered Sales of Equity Securities*	50	3.3%	2,288	1.4%
I503	*Amend Articles, Bylaws, Fiscal Year End*	37	2.4%	4,197	2.5%
I507	*Submit Matters to a Vote of Security Holders*	31	2.0%	12,989	7.8%
I301	*Notice of Delisting / Transfer of Listing*	27	1.8%	1,389	0.8%
I402	*Non-Reliance on Previously Issued Financials*	25	1.7%	260	0.2%
I203	*Creation of a Direct Financial Obligation*	21	1.4%	7,702	4.6%
I201	*Acquisition or Disposition of Assets*	21	1.4%	2,670	1.6%
I102	*Termination of a Material Definitive Agreement*	20	1.3%	2,081	1.2%
I206	*Material Impairments*	10	0.7%	351	0.2%
I204	*Events that Increase Direct Financial Obligation*	6	0.4%	187	0.1%
I401	*Changes in Registrant's Certifying Accountant*	4	0.3%	785	0.5%
I103	*Bankruptcy or Receivership*	4	0.3%	26	0.0%
I504	*Suspend Trading Under Employee Benefit Plans*	1	0.1%	138	0.1%

Panel C: Univariate statistics across NYSE and Nasdaq 8-Ks

	NYSE=1 (n= 70,946)		*NYSE=0* (n= 97,241)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
$Halt_t$	0.0050	0.0000	0.0119	0.0000		<0.01
$LnMVE_{t-1}$	7.9959	7.9262	5.9201	5.8121	<0.01	<0.01
$Volume_{t-1}$	0.1349	0.0509	0.0543	0.0114	0.0400	<0.01
$Volatility_{t-1}$	0.0204	0.0172	0.0292	0.0238	<0.01	<0.02
$LnNumAnalysts_{t-1}$	2.2732	2.3979	1.4834	1.6094	<0.01	<0.03
$InstOwn_{t-1}$	0.6925	0.7468	0.4933	0.5022	<0.01	<0.04
$AbsEventRet_t$	0.0317	0.0190	0.0409	0.0239	<0.01	<0.05
$MktHoursIndicator_t$	0.2103	0.0000	0.2305	0.0000		<0.06
$I901\_Indicator_t$	0.7509	1.0000	0.7355	1.0000		<0.07
$I801\_Indicator_t$	0.2201	0.0000	0.2440	0.0000		<0.08
$I701\_Indicator_t$	0.2314	0.0000	0.1583	0.0000		<0.09
$I202\_Indicator_t$	0.3066	0.0000	0.3115	0.0000		<0.10
I101_Indicatort	0.1194	0.0000	0.1207	0.0000		<0.11

Table A2 (continued)

Panel D: Multivariate logistic regressions

Dependent Variable:	***$Halt_t$***		***$Halt_t$***		***$Proactive\_Halt_t$***		***$Reactive\_Halt_t$***		
Sample:	***Pooled***		***Entropy-Balanced [all covariates in (1)]***		***Entropy-Balanced [all covariates in (1)]***		***Entropy-Balanced [all covariates in (1)]***		
	(1)		(2)		(3)		(4)		*Test (3) - (4) = 0*
	Margin	*z-stat*	Margin	*z-stat*	Margin	*z-stat*	Margin	*z-stat*	*p-value*
$NYSE_t$	-0.0028	*-6.38* ***	-0.0029	*-3.69* ***	-0.0021	*-3.86* ***	0.0003	*0.87*	*<0.01*
Prior Quarter Control Variables									
$LnMVE_{t-1}$	0.0001	*0.64*							
$Volume_{t-1}$	0.0005	*0.37*							
$Volatility_{t-1}$	0.0524	*5.35* ***							
$LnNumAnalysts_{t-1}$	-0.0004	*-1.23*							
$InstOwn_{t-1}$	0.0025	*3.58* ***							
Event Window Controls									
$AbsEventRet_t$	0.0650	*25.79* ***							
$MktHoursIndicator_t$	0.0007	*1.84* *							
$I901\_Indicator_t$	0.0015	*3.84* ***							
$I801\_Indicator_t$	0.0043	*10.76* ***							
$I701\_Indicator_t$	0.0027	*6.20* ***							
$I202\_Indicator_t$	0.0030	*7.39* ***							
$I101\_Indicator_t$	0.0034	*6.65* ***							
Fixed Effects	*Time, Industry*		*No*		*No*		*No*		
Psuedo R-Square	*0.131*		*0.004*		*0.006*		*0.001*		
Area under ROC	*0.809*		*NA*		*NA*		*NA*		
N	*167,296*		*167,872*		*167,609*		*167,605*		

Table A3: Tests evaluating halts and constituent preferences (8-K sample)
This table provides details on the tests of whether constituent preferences are associated with halts, using the 8-K sample. Panel A (Panel B) provides descriptive statistics and univariate tests for proactive (reactive) halts. Tests of differences are based on two-sided t-tests for means, Wilcoxon rank-sum tests for medians, and χ^2 tests for binary variables. Panel C provides multivariate logistic regressions. Column (1) examines the association between proactive halts and the constituent preference proxies. Column (2) examines the association between reactive halts and the constituent preference proxies. Column (3) tests the differences between Columns (1) and (2) using seemingly unrelated regression techniques for a linear probability model. Time fixed effects use quarter-years and industry fixed effects use 2-digit SIC codes. Variables defined in Internet Appendix Variable Definitions following the tables. Regression marginal effects are calculated holding all other covariates at the sample mean. Regression standard errors are Huber/White robust estimators clustered by firm.

Panel A: Univariate statistics across Proactive Halt and Non-Proactive Halt 8-Ks

	Proactive_Halt=1 (n= 697)		*Proactive_Halt=0* (n= 141,058)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
EventGoodNewsIndicator $_t$	0.4060	0.0000	0.5150	1.0000		<0.01
CEOOpportunisticTrader $_t$	0.5466	1.0000	0.5605	1.0000		0.46
CEORoutineTrader $_t$	0.2712	0.0000	0.3088	0.0000		0.03
ShortInterest $_{t-1}$	0.0736	0.0391	0.0488	0.0279	<0.01	<0.01
CEOMBA $_t$	0.3458	0.0000	0.3789	0.0000		0.07
CEOAge $_t$	55.8737	55.0000	56.4748	56.0000	0.03	<0.01
CEOTenure $_t$	4.8835	2.9000	4.9216	3.1000	0.85	0.31
CEOTotBoards $_t$	2.1191	2.0000	2.1248	2.0000	0.93	0.55

Panel B: Univariate statistics across Reactive Halt and Non-Reactive Halt 8-Ks

	Reactive_Halt=1 (n= 323)		*Reactive_Halt=0* (n= 141,431)		Test of Difference (p-values)	
	Mean	Median	Mean	Median	Mean	Median
EventGoodNewsIndicator $_t$	0.4334	0.0000	0.5147	1.0000		<0.01
CEOOpportunisticTrader $_t$	0.5913	1.0000	0.5603	1.0000		0.26
CEORoutineTrader $_t$	0.2198	0.0000	0.3088	0.0000		<0.01
ShortInterest $_{t-1}$	0.0493	0.0238	0.0489	0.0280	0.92	0.03
CEOMBA $_t$	0.3839	0.0000	0.3787	0.0000		0.85
CEOAge $_t$	56.8731	56.0000	56.4710	56.0000	0.33	0.80
CEOTenure $_t$	4.9353	2.4000	4.9214	3.1000	0.96	0.07
CEOTotBoards $_t$	2.0433	1.0000	2.1249	2.0000	0.36	0.05

Table A3 (continued)

Panel C: Multivariate logistic regressions

Dependent Variable:		***Proactive_Halt*** $_t$			***Reactive_Halt*** $_t$			***Test (1) - (2) = 0***
		(1)			(2)			(3)
	Pred	Margin	*z-stat*		Margin	*z-stat*		*p-value*
Constituent Preference Variables								
EventGoodNewsIndicator $_t$	(-)	-0.0022	*-5.68*	***	-0.0006	*-2.00*	**	*<0.01*
CEOOpportunisticTrader $_t$	(-)	-0.0015	*-2.52*	**	0.0000	*0.13*		*0.02*
CEORoutineTrader $_t$	(-)	-0.0011	*-1.60*		-0.0002	*-0.44*		*0.10*
ShortInterest $_{t-1}$	(+)	0.0127	*3.70*	***	-0.0071	*-2.48*	**	*<0.01*
CEOMBA $_t$	(+/-)	-0.0004	*-0.90*		0.0002	*0.53*		*0.20*
CEOAge $_t$	(+/-)	0.0000	*-0.37*		0.0000	*2.16*	**	*0.07*
CEOTenure $_t$	(+/-)	0.0000	*0.42*		0.0000	*0.97*		*0.98*
CEOTotBoards $_t$	(+/-)	0.0001	*0.31*		0.0000	*-0.31*		*0.53*
Prior Quarter Control Variables								
LnMVE $_{t-1}$		0.0003	*1.18*		-0.0003	*-1.86*	*	
Volume $_{t-1}$		0.0017	*1.01*		0.0018	*1.50*		
Volatility $_{t-1}$		-0.0015	*-0.10*		0.0433	*4.62*	***	
LnNumAnalysts $_{t-1}$		-0.0002	*-0.57*		-0.0004	*-1.45*		
InstOwn $_{t-1}$		0.0017	*1.75*	*	0.0025	*3.34*	***	
Event Window Controls								
NYSE $_t$		-0.0029	*-5.34*	***	0.0005	*1.12*		
AbsEventRet $_t$		0.0737	*18.92*	***	0.0290	*11.52*	***	
MktHoursIndicator $_t$		0.0012	*2.09*	**	0.0004	*0.97*		
I901_Indicator $_t$		0.0017	*3.04*	***	0.0002	*0.43*		
I801_Indicator $_t$		0.0039	*7.00*	***	0.0013	*3.28*	***	
I701_Indicator $_t$		0.0031	*5.27*	***	0.0010	*2.35*	**	
I202_Indicator $_t$		0.0028	*5.11*	***	0.0018	*4.83*	***	
I101_Indicator $_t$		0.0032	*4.12*	***	-0.0001	*-0.14*		
Fixed Effects		*Time, Industry*			*Time, Industry*			
Psuedo R-Square		*0.131*			*0.144*			
Area under ROC		*0.804*			*0.840*			
N		*137,846*			*132,176*			

Table A4: Market consequences associated with unexplained discretion (8-K sample)
This table provides details on the tests of market consequences associated with unexplained discretion, using the 8-K sample. Panel A provides multivariate logistic regressions to examine the association between small halt returns and the level of unexplained halt discretion. Panel B provides multivariate regressions to examine the association between post-halt stock return reversals and the level of unexplained halt discretion. We proxy for unexplained halt discretion using the residual (i.e., one minus the predicted probability) from a proactive halt model containing the control variables in Table A2; *q(Residual)* is the quartile (scaled between zero and one) of this residual; *qN-Residual* is a dummy variable set to one if the residual is in the Nth quartile. This analysis uses all proactive halts with available stock return data. Variables defined in Internet Appendix Variable Definitions following the tables. Regression marginal effects are calculated holding all other covariates at the sample mean. Standard errors are Huber/White robust estimators clustered by firm.

Panel A: Small halt return tests

Dependent Variable: SmallHaltReturn$_t$						
	(1)			(2)		
	Margin	*z-stat*		Margin	*z-stat*	
Primary Variable(s)						
q(Residual8k$_t$)	0.2355	*7.47*	***			
q2-Residual8k$_t$				0.2390	*3.17*	***
q3-Residual8k$_t$				0.3285	*4.13*	***
q4-Residual8k$_t$				0.4594	*5.45*	***
Psuedo R-Square	*0.090*			*0.097*		
Area under ROC	*0.710*			*0.710*		
N	*758*			*758*		

Panel B: Stock return reversal tests

Dependent Variable: PostHaltReturn$_t$						
	(1)			(2)		
	Coef.	*t-stat*		Coef.	*t-stat*	
Primary Variable(s)						
HaltReturn$_t$	-0.0798	*-2.04*	**			
q(Residual8k$_t$) x HaltReturn$_t$	-0.2151	*-2.60*	***			
q1-Residual8k$_t$ x HaltReturn$_t$				-0.0574	*-1.31*	
q2-Residual8k$_t$ x HaltReturn$_t$				-0.2088	*-3.93*	***
q3-Residual8k$_t$ x HaltReturn$_t$				-0.3094	*-4.30*	***
q4-Residual8k$_t$ x HaltReturn$_t$				-0.1750	*-2.87*	***
Control Variable(s)						
PreHaltReturn$_t$	-0.0485	*-0.74*		-0.0325	*-0.51*	
Adjusted R-Square	*0.088*			*0.099*		
N	*758*			*758*		

Internet Appendix Variable Definitions

<u>Trading Halt Variables:</u>

Halt	= 1 if there is an individual stock trading halt, 0 otherwise.
Proactive_Halt	= 1 if there is a proactive-individual stock trading halt, 0 otherwise. We define a halt as proactive if the 5-minute return immediately preceding the halt (calculated using midpoints of the bid-ask spread) is less than 5 percent.
Reactive_Halt	= 1 if there is a reactive-individual stock trading halt, 0 otherwise. We define a halt as reactive if the 5-minute return immediately preceding the halt (calculated using midpoints of the bid-ask spread) is greater than or equal to 5 percent.

<u>Independent Variables of Interest:</u>

NYSE	= 1 if the firm is listed on NYSE, 0 if the firm is listed on Nasdaq.
EventGoodNewsIndicator	= 1 if the 2-day return beginning with the close prior to the 8-K acceptance time is positive, 0 otherwise.
CEORoutineTrader	= 1 if the CEO's trading is defined as routine, 0 if the trading is not defined as routine or the CEO does not trade during the 15-month period ending with the current quarter. Following Cohen, Malloy, and Pomorski (2012), we classify a CEO as a routine trader if she trades in the same direction (buy or sell) and the same month for three consecutive years.
CEOOpportunisticTrader	= 1 if the CEO trades stock but does not meet the definition of *CEORoutineTrader*, 0 if *CEORoutineTrader*=1 or the CEO does not trade during the 15-month period ending with the current quarter.
CEOMBA	= 1 if the CEO has an MBA (per BoardEx), 0 otherwise.
CEOAge	= CEO age (per BoardEx).
CEOTenure	= number of years the CEO has been in his position (per BoardEx).
CEOTotBoards	= number of boards the CEO serves on for quoted firms (per BoardEx).
ShortInterest	= Number of short sale positions in the company (as of the end of the prior quarter), scaled by the number of shares outstanding.

<u>Control Variables:</u>

LnMVE	= log (market value of equity as of the end of the prior quarter).
Volume	= volume (in billions of shares) in the prior quarter.
Volatility	= standard deviation of daily stock returns in the prior quarter.
LnNumAnalysts	= log (1 + number of analysts following the firm in the prior quarter)
InstOwn	= the proportion of shares (from 0 to 1) owned by institutional investors as of the end of the prior quarter, calculated using data from Thomson Reuters.

AbsEventRet	= the absolute value of the two-day return beginning with the close prior to the 8-K acceptance time.
MktHoursIndicator	= 1 if the 8-K is accepted by the SEC within standard market hours (9:30a.m. – 4:00p.m. Eastern Time), 0 otherwise.
I901_Indicator	= 1 if the 8-K includes topic I901 (Financial Statements and Exhibits), 0 otherwise.
I801_Indicator	= 1 if the 8-K includes topic I801 (Other Events), 0 otherwise.
I701_Indicator	= 1 if the 8-K includes topic I701 (Regulation FD Disclosure), 0 otherwise.
I202_Indicator	= 1 if the 8-K includes topic I202 (Results of Operations and Financial Condition), 0 otherwise.
I101_Indicator	= 1 if the 8-K includes topic I101 (Entry into a Material Definitive Agreement), 0 otherwise.

Market Consequence Variables:
We compute returns based on the midpoint of the bid-ask spread for halts with regular quotes. We exclude observations with spreads more than 100 percent of the midpoint in the window beginning 10-minutes before the halt through 10-minutes after.

HaltReturn	= The stock return over the halt period.
PreHaltReturn	= The stock return in the 10-minutes preceding the halt.
PostHaltReturn	= The stock return in the 10-minutes following the halt.
SmallHaltReturn	= 1 if the *HaltReturn* is less than 50bp, 0 otherwise.
Residual8k	= the portion of a proactive halt unexplained by firm information or fundamentals, calculated as the residual (i.e., one minus the predicted probability) from the 8-K logistic model for proactive halts including controls from Table A2.